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April 8, 1998

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Re: Revised Remedial Action (RRA) at the Enviro-Chem Site, Zionsville, Indiana

Final Geotechnical Survey Report on the Southern Concrete Pad Area

Dear Trustees:

Enclosed is the final Geotechnical Survey Report on the Southern Concrete Pad area. Please note that the geotechnical data from the supplemental hot spot survey have been integrated into the report and are also summarized in Appendix E of the report.

Should you have any questions or require further clarification on this report, please call me at (215)788-7844 extension 222.

Very truly yours,

G.J. Anastos, Ph.D., P.E.

Project Manager

enclosure

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Geotechnical Report for the Southern Concrete Pad Area Enviro-Chem Site Zionsville, Indiana

April 8, 1998

This document has been prepared in accordance with accepted scientific and engineering practices and procedures and Versar, Inc.'s Quality Assurance Program.



TABLE OF CONTENTS

1.0 INTRO	DUCTI	ON
2.0 SUBSUI	RFACE	INVESTIGATION AND LABORATORY TESTING 3 -
2.1	2.1.1 2.1.2	Subsurface Investigation
2.2	2.1.2	Preliminary Hot Spot Report
2.3		Field and Laboratory Soil Testing 5 -
3.0 SITE CO	ONDITI	ONS 6 -
3.1 3.2		Soil Conditions
4.0 ANALY	SIS AN	D RECOMMENDATIONS 10 -
4.1		Sheet Piling 11 -
4.2		Temporary Shoring 12 -
4.3		Stability of Excavation Slopes
4.4		Dewatering
5.0 QUALII	FICATI	ONS 17 -
		APPENDICES
Appendix A	L	
Figu	re 1 - Bo	ring Location Plan
_		il Cross Section A - A' - E725,950
_		il Cross Section B - B' - E725,900
_		il Cross Section C - C' - N921,645
•		il Cross Section D - D' - N921,670
_	•	drogeologic Schematic
		cavation Boundary
•		lope Stability Analysis in Cohesive Soil, Undrained Conditions (Ø=0)

Appendix B

Boring Logs Well Logs

Appendix C

Summary of Shallow Soil Test Data Tables Laboratory Testing Sheets

Appendix D

Dewatering Pumping Rate Estimates by Radian

Appendix E

Preliminary Hot Spot Report

1.0 INTRODUCTION

This report presents the results of the subsurface geotechnical exploration, laboratory testing and geotechnical evaluations for the Enviro-Chem Superfund site (performed during the period 26 January 1998 to 20 February 1998). In addition, supplemental geohydrological data from the Preliminary Hot Spot Report dated 26 March 1998 have been incorporated. ¹

The Enviro-Chem site is located in Boone County, approximately 10 miles northwest of Indianapolis, on U.S. Highway 421 in Zionsville, Indiana. The site lies to the west of the North Side Sanitary Landfill, a closed solid waste disposal facility which is also a Superfund Site. The Enviro-Chem Site is bounded on the south, east, and north by property owned by members of the Bankert Family, and on the west by a Bankert-controlled corporation, Boone County Resource Recovery Systems, Inc. An unnamed ditch separates the Enviro-Chem Site and North Side Sanitary Landfill along Enviro-Chem's eastern boundary.

As outlined in the Technical Design Report and Technical Specifications prepared by Radian, this report has been prepared by an Indiana-registered professional engineer that specializes in geotechnical engineering. The report provides the specified written documentation for review and concurrence by the USEPA and IDEM concerning the following items:

- confirmation of the preliminary excavation stability analysis,
- evaluation of the need for the proposed sheet pile cutoff wall, and
- information needed to determine the maximum safe depth of excavation in the Southern Concrete Pad Area.

The purpose of the subsurface exploration was to determine the extent and the nature of the principle soil strata, to determine the depth to groundwater, and to obtain samples of the various soils for identification of engineering soil properties. The thickness and horizontal extent of the various soils encountered, the zone of saturation, consistency, and assessment of shear strengths are shown on the appended boring logs and soil cross sections.

¹ The purpose of the Preliminary Hot Spot Report was to further investigate concentrated organics identified in borings G-17 and G-18 during the Geotechnical Survey of the Southern Concrete Pad Area.



Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 2 of 17

The subsurface exploration for the Geotechnical Survey of the Southern concrete pad area consisted of 18 soil borings (two of the borings were converted into piezometers for a pump test) and one pump well drilled and sampled to depths ranging from 24 to 36 feet below the existing ground surface. Boring locations and depths were specified by Versar. Boring locations are provided on Figure 1 - Boring Location Plan (Appendix A). Supplemental geohydrological data from the Preliminary Hot Spot Report consisted of five borings ranging in depth from 20 to 39 feet below the existing ground surface (boring locations are supplied on Figure 1 of Appendix E).

The following sections of this report describe the subsurface investigation, laboratory testing, current site conditions, and geotechnical engineering analysis.



2.0 SUBSURFACE INVESTIGATION AND LABORATORY TESTING

2.1 Subsurface Investigation

2.1.1 Geotechnical Survey of the Southern Concrete Pad Area

The subsurface exploration was conducted between January 26, 1998 and February 20, 1998 and consisted of the installation of 19 soil borings, two piezometers, and one pumping well; sampling of representative soil strata; and laboratory testing to define geotechnical design criteria. The borings were advanced to depths ranging from 24 to 36 feet below the existing ground surface.

Drilling services were provided to Versar by Philip Environmental Services of Columbia, Illinois. A Central Mine Equipment CME-75 truck-mounted, drill rig was used to access and drill the soil borings. Soil borings were "double cased" (to minimize the potential for carrying contaminated soil to lower depths) by advancing the boring using 12-inch hollow stem augers with a center plug to a depth of 6 feet. At six feet, a 12-inch, steel casing was installed and grouted in place. After allowing the grout to harden for a period of 24 hours, the borings were advanced using 4¼-inch hollow stem augers with a center plug to the boring termination depth. The center plug was removed to allow for collection of soil samples though the augers.

Soil samples were collected according to ASTM D1586, "Standard Penetration Test and Split Barrel Sampling of Soils" and ASTM D1587, "Standard Test Method for Thin Walled Tube Sampling of Soils." Samples were collected continuously, in two-foot increments, from the ground surface through the termination depth of each boring.

Upon completion, the borings were tremie grouted with a cement-bentonite grout. The grout mix consisted of 94 pounds of cement to five pounds bentonite powder and seven gallons of water.

Borings G-2-98 and G-6-98 were installed with two-inch diameter piezometers, while G-19-98 was installed with a six-inch pump test well. The piezometers and pumping well were constructed with polyvinyl chloride (PVC) well material. Piezometer screens were constructed with a 0.010-inch continuous wrap screen with a nine-foot six-inch screened opening between depths of 8½ and 18 feet and 16½ and 26 feet, respectively. The pumping well was constructed with a six-inch diameter by ten-foot long continuous wrap screen. Well logs detailing the remaining well construction are provided in Appendix B.

After completion of the borings and wells, an Indiana-registered land surveyor located the borings and wells according to USGS state plain coordinates and elevations. Boring coordinates and elevations are provided on the attached boring logs.



2.1.2 Preliminary Hot Spot Report

The supplemental survey in the vicinity of G-17 and G-18 was conducted between 9 March 1998 and 17 March 1998. It consisted of the installation of five borings, two of which were converted into injection/extraction wells. The borings were advanced to depths ranging from 20 to 39 feet below the ground surface, (see Figure 1 in Appendix E for locations of the borings).

Drilling services were provided to Versar by Top Flight, Inc of Gary, Indiana. A truck-mounted hollow stem auger, drill rig was used to access and drill the soil borings. Soil borings were "double cased" (to minimize the potential for carrying contaminated soil to lower depths) by advancing the boring using 12-inch diameter hollow stem augers with a center plug to a depth of 6 feet. At six feet, a 12-inch steel casing was installed and grouted in place. After allowing the grout to harden for a period of 24 hours, the borings were advanced using 4½-inch hollow stem augers with a center plug to the boring termination depth. The center plug was removed to allow for collection of soil samples though the augers.

Borings IW-1 and IW-4 were converted to four-inch diameter injection/extraction wells with screening starting at 11 and 17 feet below ground surface, respectively. The injection/extraction wells were constructed with four-inch diameter, 0.020 slot PVC screening. Logs detailing field observations and well construction are provided in Appendix E.

All borings not converted to injection/extraction wells were cement grouted to the surface.

2.2 Engineering Oversight

The exploration was directed in the field by Versar. Versar's field representative documented the exploration activities and directed the driller as to the drilling sequence for the borings, confirmed the drilling and sampling procedures were performed as specified in the Pre-Construction Test Drilling Plan, and determined the final depth of each boring based on soil consistency.

Versar also inspected, logged and classified each soil sample. Field logs used to document the condition encountered in each boring included a description of the soil conditions, including standard penetration tests results (N, blows per foot (bpf)), penetration resistance test results (Q_p , tons per square foot (tsf)), unconfined compressive strength (Q_u , tsf), and head space screening results (PID, parts per million (ppm)). Final boring logs contained in Appendix B were prepared by a geotechnical engineer after examining the soil samples, reviewing the field boring logs, and evaluating laboratory test data.



2.3 Field and Laboratory Soil Testing

Visual descriptions of soil samples collected for the Geotechnical Survey for the Southern Concrete Pad Area were made in the field and verified in the laboratory by an experienced geotechnical engineer. Soil samples from each stratum identified were selected for laboratory testing to characterize the physical properties of the subsurface soils. The field and laboratory testing program was developed by Versar with laboratory testing performed by Wang Engineering. The testing program consisted of the following field and laboratory test procedures:

Field-Testing Procedures:

- Standard Classification of Soil for Engineering Purposes (Unified Soil Classification System) (ASTM D2487),
- Unconfined Compressive Strength using a Hand Penetrometer (Q_u, tsf), and
- Unconfined Compressive Strength using a Rimac Compression Apparatus (Q_u, tsf).

Laboratory Testing Procedures:

- Natural Moisture Content Determination (%w) (ASTM D2216),
- Laboratory Density Determination (ρ, lb/ft³),
- Specific Gravity (G_s, unitless) (ASTM D584),
- Unconfined Compressive Strength (Q_u, tsf) (ASTM D2166),
- Particle Size Analysis (ASTM D421, D422, D2217 and D1140),
- Atterberg Limits (Liquid Limit, LL, Plasticity Index, PI) (ASTM D4318)

Laboratory testing results are presented on the final soil boring logs and in Appendix B. A brief description of the Unified Soil Classification System is included with the soil boring logs. Soil samples will be returned to the site after completion of the laboratory testing program.



3.0 SITE CONDITIONS

The Enviro-Chem site is located approximately 10 miles northwest of Indianapolis, on U.S. Highway 421 in rural area near Zionsville, Indiana. The site lies to the west of the Northside Sanitary Landfill, a closed solid waste disposal facility which is also a Superfund Site. The Enviro-Chem Site is bounded by vacant properties to the north and south and to the west by Boone County Resource Recovery Systems, Inc. (scrap facility).

An unnamed ditch separates the Enviro-Chem Site and Northside Sanitary Landfill along Enviro-Chem's eastern boundary. The ditch enters a small pond located approximately 200 feet south of the southern Remedial Boundary. Surface water elevations of the unnamed ditch and pond were recorded during our investigation at 877.8 and 875.1 feet, respectively.

The Enviro-Chem site is relatively flat with 10 feet of elevation relief measured from the northern SVE Treatment Area to the southern remedial boundary of Southern Concrete Pad Excavation Area. The investigation was performed in the Southern Concrete Pad Excavation Area, where the elevation of the building floor slab ranged from 882.7 feet at the southeast corner of the slab to 885.6 feet at the northwest corner. Natural grades surrounding the site are typically level to gently rolling. The Northside Sanitary Landfill is the only significant grade change with an elevation greater than the Enviro-Chem Site.

3.1 Soil Conditions

Our interpretation of the site stratigraphy and variation of the soil conditions encountered at the boring sites are presented on soil cross-sections in Appendix A and on the final boring logs in Appendix B. Figure 2 in Appendix E is the cross-section from the Preliminary Hot Spot Survey. The strata contact lines shown on the cross-sections (See Figures 2, 3, 4, and 5) and boring logs represent approximate boundaries between soil types. Actual transitions between soil types are gradual in both the horizontal and vertical directions.

Regional geologic conditions consist of a relatively thick sequence of glacial deposits overlying limestone bedrock. The unconsolidated deposits in the site vicinity are in excess of 150 feet thick and consist of predominately glacial till sequences separated by discontinuous thin to moderately thick sand and gravel outwash deposits.

Borings at the Southern Concrete Pad were advanced though an unreinforced concrete pad and underlying crushed stone subbase. Concrete thickness ranged from 7 to 13 inches. At time of our exploration, the southern half the Southern Concrete Pad was underwater/flooded. The subbase was saturated.

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Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 7 of 17

Below the crushed stone subbase and in borings located off the Southern Concrete Pad, a lean clay to sandy lean clay fill layer was encountered. Because the Southern Concrete Pad was flooded at the time of our exploration, the clay fill was saturated and typically had low shear strength. The fill was relatively free of construction debris and other deleterious material that may affect placement in the SVE Treatment Area.

Below the surficial soils, the borings encountered glacial till deposits consisting of sandy lean clay, lean clay with sand, sandy silty clay and lean clays with occasional thin, saturated sand lenses (thickness usually less than four inches). The weathered till deposit was brown grading to gray at depth of approximately 10 feet. The unsaturated clay till has moisture content that ranges from 9 to 12 percent and unconfined compressive strength of one to four tons per square foot (tsf). Where the clayey soil is coincident with the elevation of the Unnamed Creek or a saturated finite discontinuous sand layer, the moisture content approached and may have exceeded 20 percent, with a compressive strength as low as 0.5 tsf.

Beneath the upper clayey till, the borings encountered a glacial outwash or alluvial deposit consisting of loose to medium dense, medium to coarse grained, saturated, gray sand. The depth of the sand layer was reported to range from eight feet in the northeast corner of the pad to 22 feet in other areas. In some borings, the sand was encountered through the boring termination depth, while in other areas, the sand was underlain by very stiff to hard, gray lean clay with sand or sandy lean clay till. The deep clay till had unsaturated moisture contents between 9 and 12 percent and unconfined compressive strength that ranged from two to ten tsf. Where found, the clay till was encountered through the termination depth of the borings.

It should be noted that the geological conditions encountered during the hot spot evaluation were similar to those conditions encountered during the geotechnical evaluation, <u>however</u>, it was determined that the glacial outwash sand units were not continuous in the area of the hot spot.

3.2 **Groundwater Conditions**

Groundwater depth observations were noted on the field boring logs while drilling each soil boring. Observations used to note the groundwater depth included either the depth at which free water appeared in the borehole or the depth of the first saturated soil sample. Groundwater elevations, as measured in the borings, are presented in Table 1 - Groundwater Elevation Observation - While Drilling.

Equilibrated Groundwater Elevations were also measured in Piezometer P-2 and P-6 and the Pump Test Well. The measurements from the wells were collected after developing the wells and allowing groundwater to stabilize in the well casing. The following groundwater elevations were recorded



Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 8 of 17

in the wells: P-2, 878.13 feet, P-6, 878.35 feet, and Pumping Well, 878.74 feet. Isolated water-bearing sand zones were found during the Preliminary Hot Spot evaluation at approximately 10 feet below ground surface (IW-1) and 18.5 feet below ground surface (IW-4). Groundwater was found at 30 to 40 feet.

Surface water elevations from two locations along Unnamed Ditch to the east of the site and of the pond to the south were also surveyed at the time of the boring location survey. Surface water elevations were measured at 875.1 and 877.8 feet along the Unnamed Ditch and at 875.1 feet in the pond.

The phreatic surface measured, corroborated by the unnamed ditch water surface elevation measurement, substantiates the absence of artesian pore water pressures. Therefore, the potentiometric surface established for slope stability and dewatering calculations is the average of the piezometric readings and contiguous detected water surface elevation.



Table 1
Ground Water Elevation Observations - While Drilling

Boring Number	Ground Water Elevation (Feet)							
G-1-98	880.1							
G-2-98	877.1							
G-3-98	876.2							
G-4-98	867.4							
G-5-98	872.6							
G-6-98	879.9							
G-7-98	865.8							
G-8-98	863.6							
G-9-98	876.4							
G-10-98	867.8							
G-11-98	864.6							
G-12-98	864.0							
G-13-98	867.9							
G-14-98	865.5							
G-15-98	863.1							
G-16-98	866.8							
G-17-98	864.6							
G-18-98	872.4							
IW-1	874.41*							
IW-4	865.91*							

^{*} estimated



4.0 ANALYSIS AND RECOMMENDATIONS

Based on our review of the Technical Design Report and Technical Specifications prepared by Radian, the remedial activities in the Southern Concrete Pad Area were to include removal of contaminated concrete, subbase, and soil to an initial depth of nine feet that is to be spread and treated on the northern portion of the site. The plan included excavation in the Southern Concrete Pad Area to a minimum depth of nine feet, subject to inspection and testing for contaminants, below the top of the concrete pad with the excavation performed in two stages. Radian's first stage required using a sheet pile cut-off wall to control groundwater infiltration during excavation. The second stage was to be performed in an open cut, provided a minimum four-foot thick soil cover was available between the floor of the excavation and the water bearing sand zone.

As outlined in the Technical Design Report and Technical Specifications prepared by Radian, an Indiana-registered professional engineer specializing in geotechnical engineering has prepared this report for review and concurrence by the USEPA, IDEM, and Enviro-Chem Trustees. The following report sections include discussion on the following items:

- maximum safe depth of excavation in the Concrete Pad Area,
- · preliminary excavation stability analysis, and
- location of the proposed sheet pile cut-off wall.

The objectives of the subsurface exploration were to determine the extent and the nature of the principle soil strata, the depth to groundwater, and to obtain samples of the various soils for identification of engineering soil properties. The geotechnical information collected during the investigation was used to provide the analysis and recommendations contained in the following section of this report. The thickness and horizontal extent of the various soils encountered, the zone of saturation, consistency, and assessment of shear strength are shown on the boring logs, soil cross sections and in the laboratory tests sheets.

Certain findings, however, are significant with respect to planning for the excavation of the Southern Concrete Pad as summarized below:

Sheet piling previously anticipated will not be required, because of the associated slope stabilities encountered. Sheet piling was specified for stabilization of soils along the excavation wall, which have been found to be extremely stable on their own, and to minimize dewatering of the excavation due to the previously encountered artesian conditions that have now been mitigated by the capping of the North Side Landfill (NSL) and the subsequent installation of a slurry wall between NSL and the Enviro-Chem site.

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Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 11 of 17

• A one-to-one slope (i.e., 45 degrees) will be required to safely excavate soils without sheet piling. Such a slope would result in a small wedge of unexcavated soil within the remedial boundary along in the southeastern corner. However, an alternative approach that will eliminate this small wedge of unexcavated soil would be the installation of temporary shoring in the south east corner of the Southern Concrete Pad Area. Consequently, temporary shoring will therefore be utilized at the southeastern corner of the excavation.

4.1 Sheet Piling

An assessment of slope stability and the elimination of the potential instability of the excavated floor of the planned removal action excavation permitted the elimination of the sheet pile wall contemplated to constrain site dewatering. Field and laboratory testing of site soil samples provided estimates of the shear strength (see Appendix C, Tables 3 through 6) of in-situ soils, the methodology utilized to analyze stability of excavated slopes and the associated diagrams used for the stability analysis are presented in Section 4.3. Therefore, the site may be excavated with side slopes of one to one using incidental excavation dewatering with local sumps.

Based on past and present hydrogeologic data, it was apparent that a large finite or discontinuous water bearing sand zone (consisting of sands and gravels) exists under the North Side Landfill (NSL) and the Southern Concrete Pad area at the Enviro-Chem Site. The top of this sand layer was encountered between 8 and 22 feet below the ground surface. Based on receipt of landfill closure operation data, capping of NSL and the subsequent installation of a slurry wall between NSL and the Enviro-Chem site appears to have eliminated or significantly reduced the hydraulic connection of this zone between the two sites. The construction of surface and subsurface hydraulic barriers has had the effect of reducing the hydrostatic pressure on this zone under the Southern Concrete Pad area, as evidenced by groundwater elevation readings on-site. As a result, it is anticipated that sheet piling previously proposed for the Southern Concrete Pad area will not be required to minimize ground water infiltration into the excavation area and subsequently dewatering.

Based on present hydrogeologic data, isolated water bearing zones may be encountered in the upper nine feet of soil. However, the volume of water expected to be produced from these zones is small and may infiltrate to the lower soils before collection by sumps can be made (See Figure 6 for a schematic of the hydrogeologic regime). Two factors identified during the site exploration support the mitigation of artesian groundwater pressure within the site excavation boundaries:

- lack of saturation within the upper clay soils, and
- capping and isolation by slurry trench of NSL.



Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 12 of 17

The degree of saturation of a soil sample is defined as the ratio of the volume of water to the volume of voids within the soil. Therefore, a value of 100% saturation is equivalent to the groundwater level in the subsurface profile. Tables 3, 4, 5, and 6 in Appendix C presents a summary of shallow soil testing data.

The water surface was also measured near the same elevation in the pump test well casing and piezometers located near Borings G-2-98 and G-6-98. In support of earlier investigations by others, who reported artesian conditions in selected site observation wells, it has been noted that the observations were made at a time before the hydrogeologic isolation of the landfill to the east. The NSL has been recently capped with impermeable soils and an engineered hydraulic barrier (slurry trench) has been constructed near the common boundary with the site. The hydraulic isolation of the landfill substantially decreased the recharge to the lower permeable sand soils, thereby reducing the hydraulic gradient and resulting piezometric pressure at the removal action site.



Based on results of the hot spot evaluation, no artesian conditions were encountered in the southwestern portion of the Southern Concrete Pad Area, further supporting the findings of the geotechnical evaluation.

4.2 <u>Temporary Shoring</u>

A safe excavation depth may be obtained at the proposed Remedial Boundary in the southeast corner of the Southern Concrete Pad Area by installing temporary sheetpiling to act as shoring. The temporary sheetpiling (MP117, 20 feet long or equivalent) would be driven in pairs from the ground surface after the removal of the Southern Concrete Pad and gravel subgrade. The temporary sheetpiling would start at the southeast corner, along the eastern remedial boundary, and continue to the north approximately 135 feet and along the southern remedial boundary to the west approximately 20 feet. The temporary sheet piling shoring is proposed to act as a cantilevered section during excavation of the contaminated soils. The side wall sampling procedure already in place can be utilized in this area. After backfilling this area to grade, the temporary sheetpiling would be removed.



4.3 <u>Stability of Excavation Slopes</u>

The methodology utilized to analyze the stability of excavation slopes progressed by identifying: 1) modes of slope failure; 2) causes of slope failure; 3) effect of soil type on the failure surface; 4) the type of stability analysis; 5) slope stability charts; and 6) Factor of Safety. Considerations for each of these criteria are provided as follows.



Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 13 of 17

- 1. MODES OF SLOPE FAILURE. Principal modes of failure considered in soil are (i) on a curved slip surface approximated by a circular arc, (ii) translation on a planar surface whose length is large compared to depth below ground, and (iii) displacement of a wedge-shaped mass along one or more planes of weakness.
- 2. CAUSES OF SLOPE FAILURE. Slope failures occur when the rupturing force exceeds resisting force. For Excavation (Cut) Slopes, failure may result from one or more of the factors described by:
 - (1) A change in a slope profile that adds driving weight at the top or decreases force at the base. Examples include steepening of the slope or undercutting of the toe.
 - (2) An increase of groundwater pressure, resulting in a decrease of frictional resistance in cohesionless soil or swell in cohesive material. Groundwater pressures may increase through the saturation of a slope from rainfall or snow melt, seepage from an artificial source, or rise of the water table.

An additional factor that was considered for cuts in stiff clays is the release of horizontal stresses during excavation, which may cause the formation of fissures. If water enters the fissures, the strength of the clay will decrease progressively. Therefore, the long-term stability of slopes excavated in cohesive soils is normally more critical than the short-term stability. Excavations are not expected to be open over a long period; therefore, no potential for swelling and loss of strength with time exists.

3. EFFECT OF SOIL TYPE.

<u>Failure Surface</u>. In homogeneous cohesive soils, the critical failure surface usually is deep, whereas shallow surface sloughing and sliding is more typical in homogeneous cohesionless soils. In nonhomogeneous soil foundations, the shape and location of the failure depends on the strength and stratification of the various soil types.

4. TYPES OF ANALYSIS For the nine feet high soil slopes in relatively homogeneous soil, the failure surface is approximated by a circular arc, along which the resisting and rupturing forces can be analyzed.

<u>Limit Equilibrium Method.</u> A limit equilibrium method was used in this geotechnical analysis assuming the validity of Coulomb's failure criterion along an assumed failure surface. A free body of the slope is considered to be acted upon by known or assumed forces. Shear stresses induced on the assumed failure surface by the body and external forces are compared with the available shear



Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 14 of 17

strength of the material. This method does not account for the load deformation characteristics of the materials in question.

5. SLOPE STABILITY CHARTS. (See Fundamentals of Soil Mechanics, D.W.Taylor, 1948)

Rotational Failure in Cohesive Soils (Ø=0)

- (1) For slopes in cohesive soils having approximately constant strength with depth, Figure 9a in Appendix A was used to determine the factor of safety.
- (2) For slopes in cohesive soil with more than one layer, centers of potentially critical circles were determined from Figure 9b in Appendix A. The appropriate shear strength was determined for each section of the arc in each stratum. The following guide for positioning the circle was used.
 - (a) If the lower soil layer is weaker, a circle tangent to the base of the weaker layer will be critical.
 - (b) If the lower soil layer is stronger, two circles, one tangent to the base of the upper weaker layer and the other tangent to the base of the lower stronger layer, should be investigated.
- 6. REQUIRED SAFETY FACTORS. The following values should be provided for reasonable assurance of stability:
 - (1) Safety factor no less than 1.5 for permanent or sustained loading conditions.
 - (2) For foundations of structures, a safety factor no less than 2.0 is desirable to limit critical movements at foundation edge.
 - (3) For temporary loading conditions or where stability reaches a minimum during construction, safety factors may be reduced to 1.3 or 1.25 if controls are maintained on load application.

The results of the stability analysis indicated that all slopes within the excavation may be safely constructed at slopes of one to one. The minimum factor of safety, calculated assuming the lowest shear strength of clay, is 2.0 for the proposed excavation. Analyses were completed to depths as much as 12 feet below existing ground surfaces. Local dewatering will be required to control precipitation and local infiltration from exposed sand lenses. Hydrostatic uplift of the clay is not anticipated.



4.4 <u>Dewatering</u>

The Radian excavation plan for the Southern Concrete Pad Area included both sheetpiling and dewatering to reduce the dewatering pump rate and associated wastewater treatment system size. This plan was conservative due to incomplete site-specific data on the stratigraphy, contamination profile (depth) and hydraulic conductivity in the Southern Concrete Pad Area. In addition, two engineering considerations have changed since the initial plan that have altered the geohydrologic regime in the vicinity of the planned excavation (i.e., North Side Landfill has been capped and a slurry wall has been installed).

Current data summarized in this report has identified a complex geohydrological regime that is comprised of silty clay with intermittent sand lenses (water bearing) and a deeper aquifer system that starts at approximately 8 to 22 feet below ground surface. Versar's best engineering judgement is that the site may be safely excavated to a depth of 12 feet across the site, when coupled with freeboard to the potentiometric surface of 872 feet.

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Versar has reviewed the ground water dewatering estimate provided by Radian, see Appendix D. Radian's estimate was based upon a pad dewatering simulation with ten wells, with and without the North Side Landfill's slurry wall. Radian's estimated dewatering pump rate of less than 50 gpm appears to be conservative. We concur with the conclusions provided, predicated upon the assumed conditions of analysis. In addition, limited field measurements during the Preliminary Hot Spot Survey led Versar to estimate dewatering pump rates at approximately 20 gpm. However, without a site-specific pump test, there is still some degree of risk associated with the elimination of the sheetpiling (previously specified to mitigate dewatering pumping rates). Versar therefore recommends the following approach:

- Initially, excavation should begin in the southwest corner of the site, utilizing two 2-cubic yard back hoes to cut an approximate 20 to 40 foot strip to the northern boundary of the excavation to a depth of nine feet. When each strip is completed, a second strip to the east would be excavated while the first strip is backfilled. Dewatering should be minimal and should be accomplished through the use of localized dewatering sumps. However, a well point dewatering system should be installed as a contingency, should deeper excavation be required.
- Should dewatering rates from the well point system and sumps exceed the capacity of the
 on-site wastewater treatment system (70 gpm), highly unlikely, the alternative available
 is to add treatment capacity through the addition of another 35-gpm wastewater treatment
 system for a period of approximately two weeks during the excavation period.



Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 16 of 17

Please note that all indications thus far lead Versar to believe that implementation of this alternative is unlikely.



Enviro-Chem RRA Geotechnical Report for Southern Concrete Pad Area Page 17 of 17

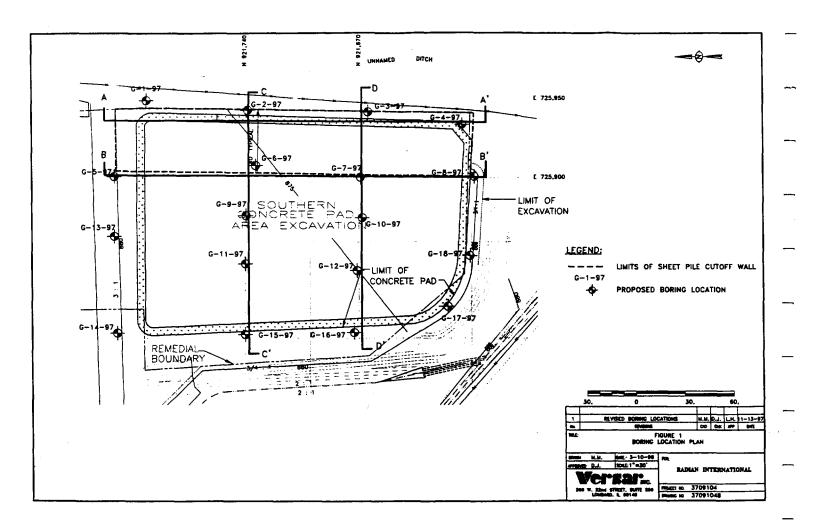
5.0 QUALIFICATIONS

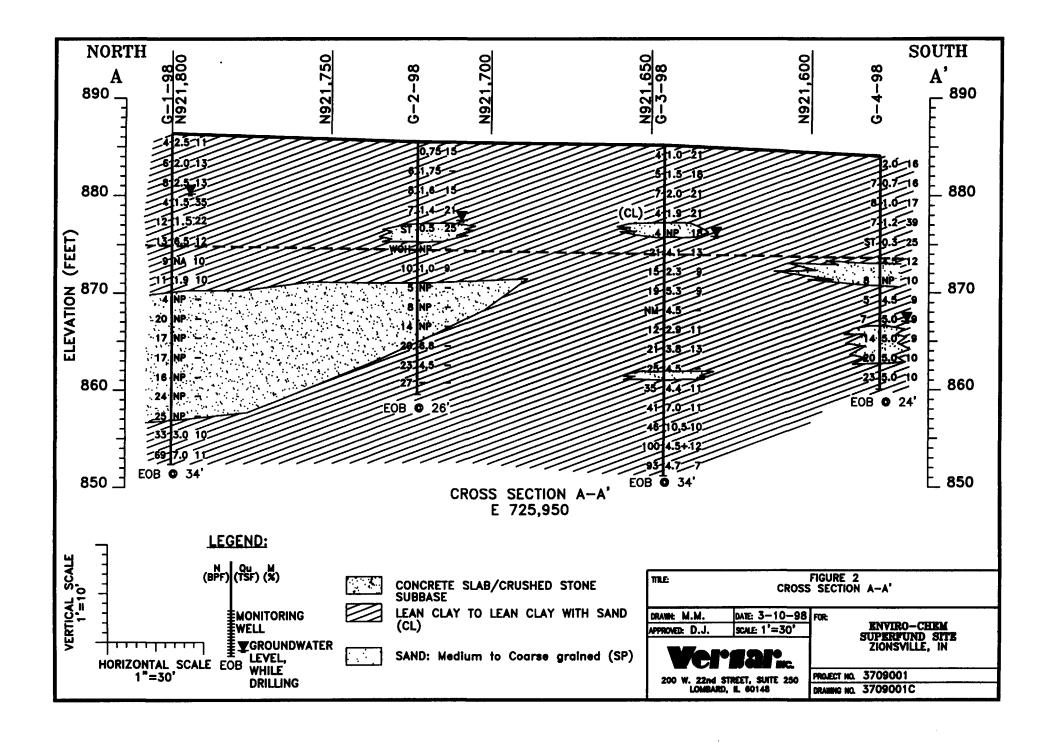
This report has been prepared with generally accepted soil and foundation engineering practice to assist in the design of the project. No other warranty expressed or implied is made. The scope of this report is limited to the specific project and location described herein and our description of the project represents our understanding of the significant geotechnical aspects. If changes in the design or location of the project improvements are planned, we should be informed so the changes can be reviewed, modified and approved in writing by the geotechnical engineer.

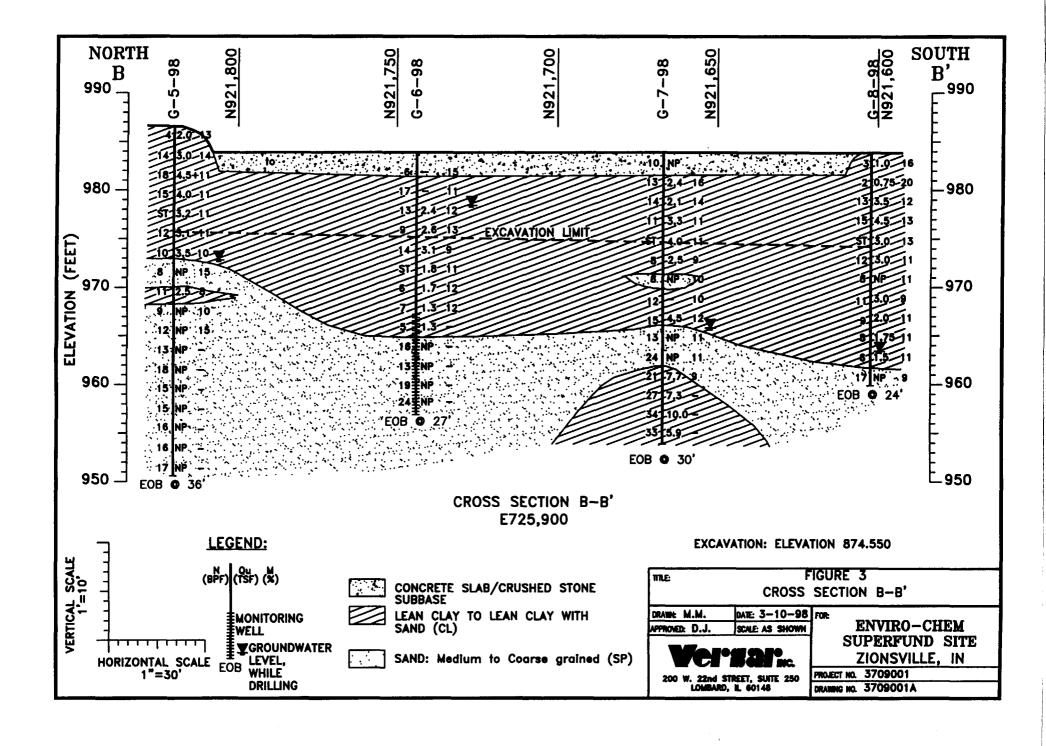


APPENDIX A

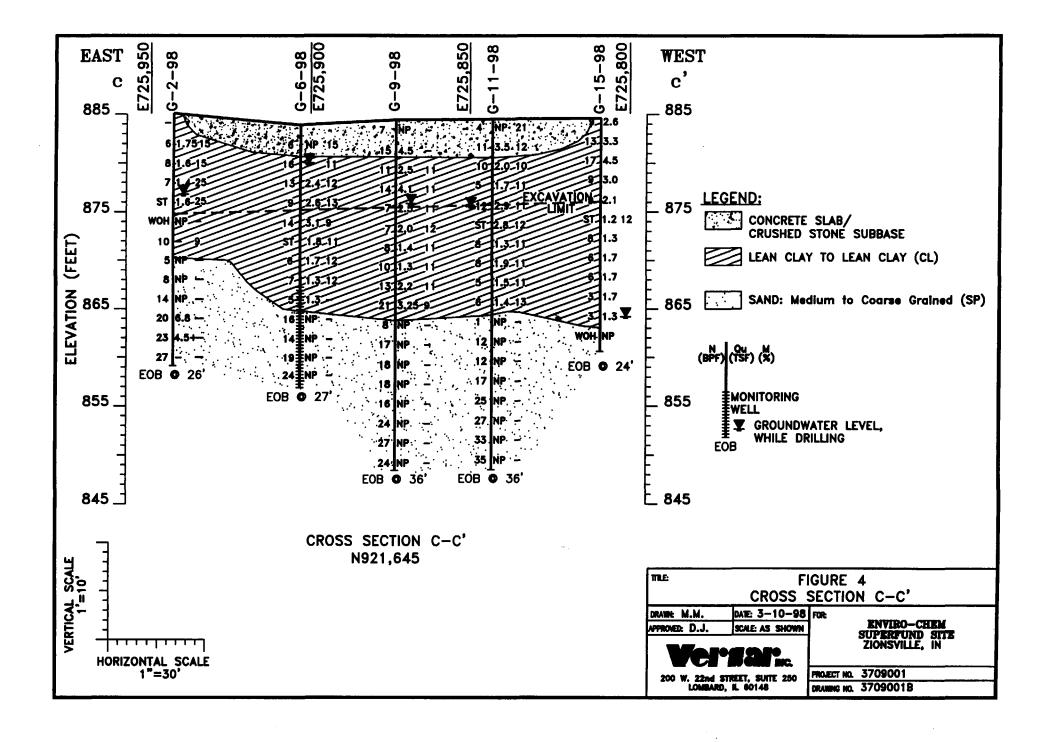
FIGURES







1 1



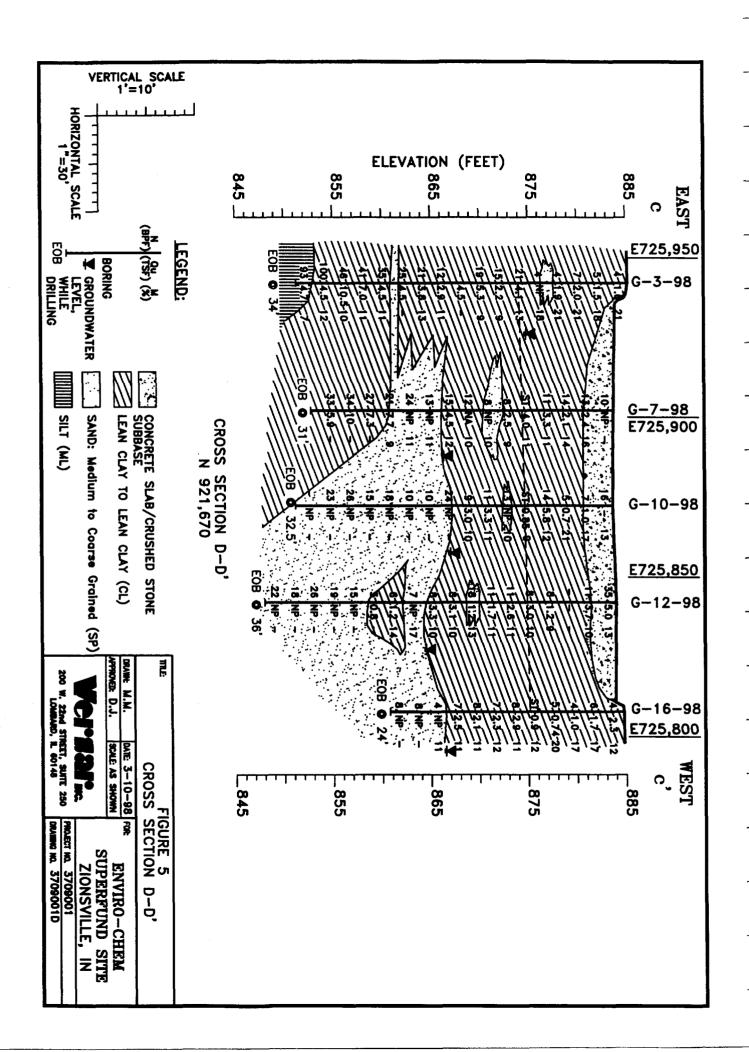
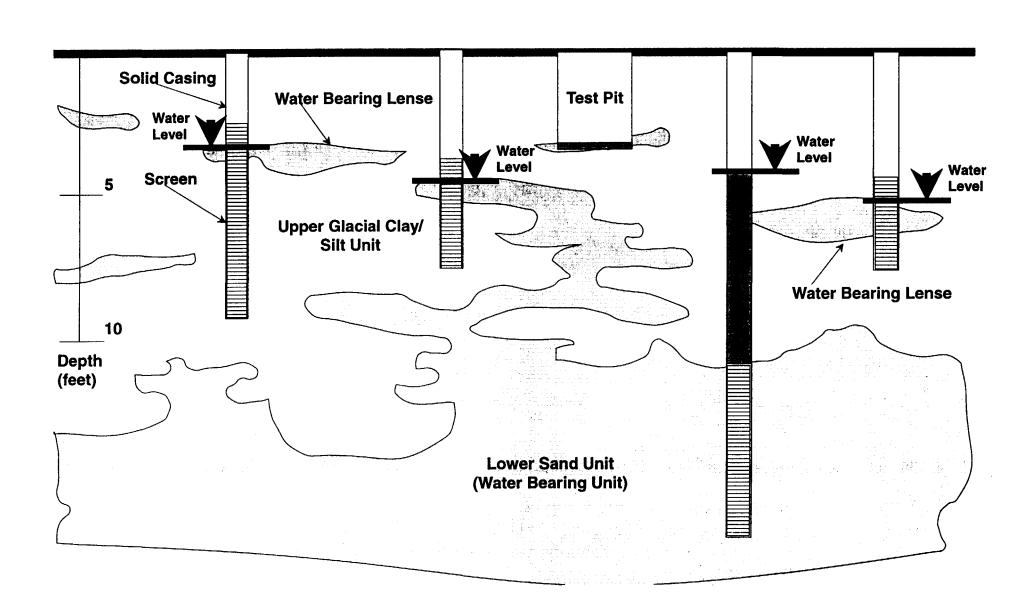


Figure 6 - Enviro-Chem Site

Hydrogeological Schematic for the Area Under the Southern Concrete Pad





15 April '98

Vince L. Epps 100 North Senate Avenue IDEM P.O. Box 6015 Indianapolis, IN 46206-6015 Michael McAteer U.S.E.P.A, HSRW-61 77 West Jackson Blvd. Chicago, IL 60604-3590

Geotechnical Survey of the Southern Concrete Pad Enviro-Chem Superfund Site Re:

As per our telephone conference call today, Versar is enclosing the revised Figure 7 for the Final As per our respirance can way, versar is enclosing the revised rights of the Southern Concrete Pad Area, dated 8 April '98. This revised

figure identifies the eastern most excavation limit as the Remedial Boundary.

It is also our understanding that both USEPA and IDEM are in concurrence with the recommendations of the report, including the elimination of the sheetpiling for excavation of the

If you have any questions, please feel free to call me at (215) 788-7844, Extension 222. Southern Concrete Pad area.

Sincerely,

& Jamestos

G. J. Anastos, Ph.D., P.E. Project Manager

enclosure

cc:

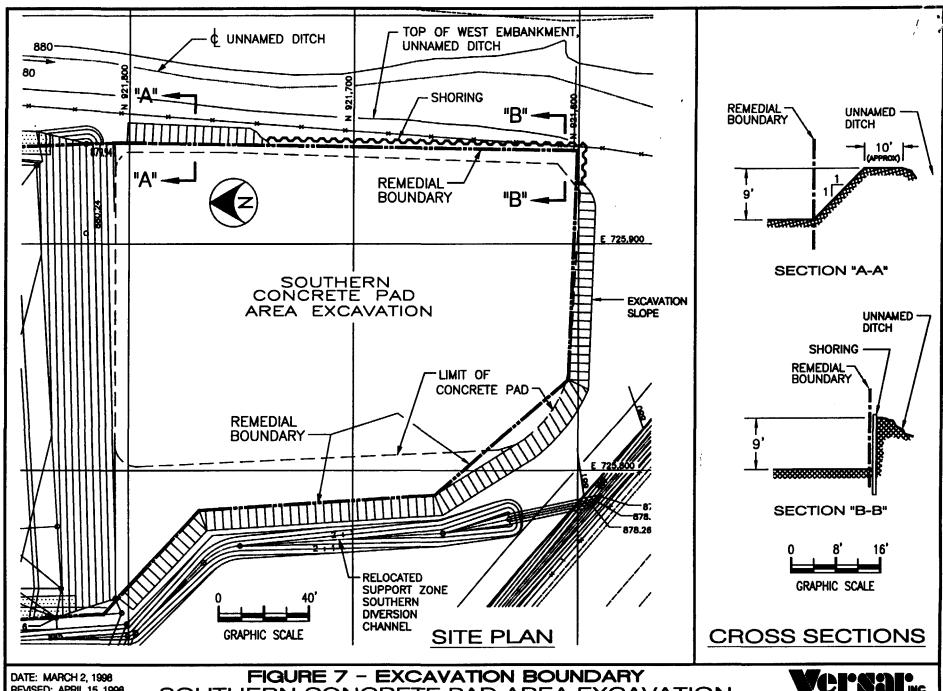
J Borucki (Versar) R Ball (ENVIRON) N Bernstein (NEB & A) M Dowiak (Radian)

C Gaffney (Versar)

T Harrison (CH2M Hill)

L Holish (Versar) R Hutchens (ENVIRON) J Kyle, III (B & T)

R Lukas (GEC)



REVISED: APRIL 15, 1998 ADDED SHORING

SOUTHERN CONCRETE PAD AREA EXCAVATION PLANS AND SECTIONS

DWG NO.: C4A

FIGURE 7 - EXCAVATION BOUNDARY TOP OF WEST EMBANKMENT, ¢ UNNAMED DITCH UNNAMED DITCH 880 -REMEDIAL REMEDIAL -BOUNDARY BOUNDARY "B" UNNAMED -DITCH (APPROX) **ACCRECATI** E 725,900 SECTION "A-A" SOUTHERN CONCRETE PAD **EXCAVATION** AREA EXCAVATION SLOPE UNNAMED DITCH REMEDIAL-BOUNDARY LIMIT OF CONCRETE PAD (MIN) REMEDIAL BOUNDARY SECTION "B-B" RELOCATED **GRAPHIC SCALE** SUPPORT ZONE SOUTHERN DIVERSION CHANNEL GRAPHIC SCALE SITE PLAN **CROSS SECTIONS** DATE: MARCH 2, 1998 SOUTHERN CONCRETE PAD AREA EXCAVATION DWG NO.: C4A

PLANS AND SECTIONS

1900 FROST ROAD, SUITE 110 BRISTOL, PA 19007 (215) 788-7844



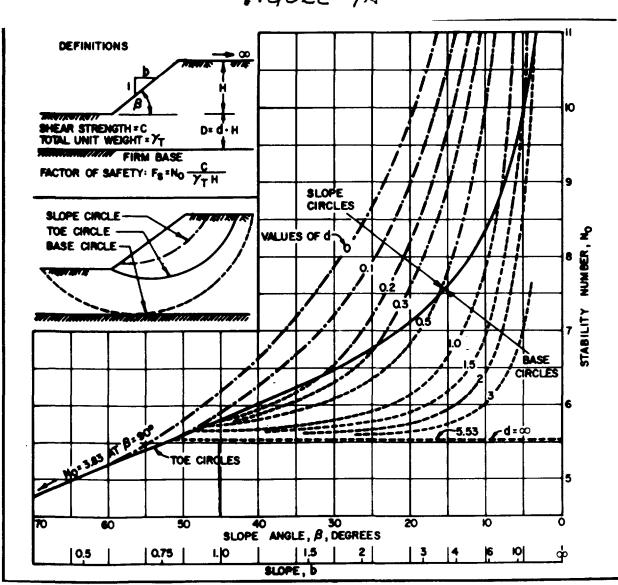
1520 Kensington Road Suite 115 Oak Brook, Illinois 60521 (708) 990-7555

Enuro Chem Sete	CLIENT	E.L. Holish					
SOIL STABILITY	Enviro Cham	3709 2/26					
REVIEWED / BY	APPROVED / / BY	2 of 3 REV					

Assumptions for Analysis

1. No openwater outside of slope
2. No surcharge or tension cracks
3. Soil is based on nearest boring homogenous to depth D
4. Thear strength is derived from cohesion only
5. failure takes place as rotation on circular arc
6. Undrained conditions for analyses

FIGURE 9A

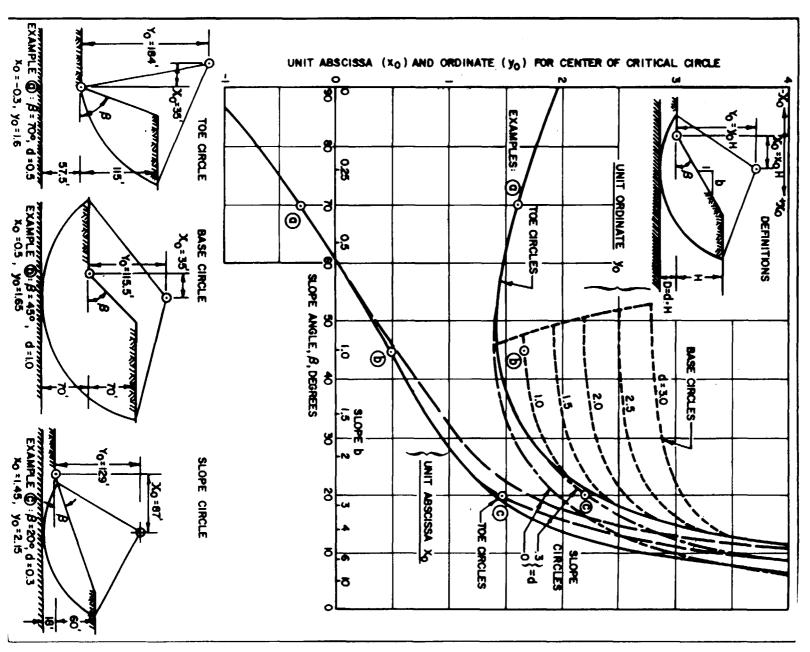


MIDWEST REGIONAL OFFICE
1520 Kensington Road
Suite 115
Oak Brook, Illinois 60521
(708) 990-7555

Thurs of chum site ВΥ Stability CLIENT Enviro Chem ВҮ PAGE S OF 3 Holish 126

FIGURE 9B

Source D.W.Taylor



APPENDIX B

BORING LOGS WELL LOGS

Ve	ANAGEMENT		Page1_ of2_								
			g No.		G-1-98				nitor Well No.		
roject Nan	ne Enviro-Chem Superfund Site		Site Location US 4:					21, Zionsville, Indiana			
iurface Ele	34.0 ft bgs	Auger Depth 32 ft bgs				ft b	gs	Rotary Depth <u>ft bgs</u>			
uadrangle	R	Date: Start			1/21/98			Finish 2/2/98			
TM (or St	948.4	Wate	r Leve	ef:				At Completion <u>▼ ft b</u> c			
	39° 57' Longitude 86°							_			
		-	<u> </u>	AIVI ভূ	MPLES				PERSONNEL		
	ation <u>Southern Concrete Pad Excavation Are</u> ipment and Method CME-75		<u>.</u>	8	inche			.	5	Geologist - C. O'Neil Driller - Dave Ellis	
mmig cqu	Sinch and Method Sinc 70	th bas	Sample No.	Sample Type	9 2	st)	ue 's/6")	ure ant (9	eadir	Helper - Justin Helper -	
Elevation	DESCRIPTION OF MATERIALS	Graphic Log Depth	Samp	Samp	Sample Recovery (inches)	Op (t	N (5)	Moisture Content (%)	PID Reading (ppm)	REMARKS	
-	LEAN CLAY FILL with Sand very stiff,		1		11.5	2.5	2	11	0	HEIMAIIKO	
- - -885.1	brown and gray, trace organics (CL-FILL)	///E 1		V		Р	2 2				
		//// E '		$ \Lambda $			4				
884.1		2	2	(-)	16	2.0	2	13	5.2		
-				\/		Р	3				
883.1 -		3		$ \Lambda $			6				
- 882.1		4	3		6	2.5	1	12	27.4		
=	UW = 134 pcf SG = 2.76		"	\mathbb{N}		2.5 P	3	'3	27.4		
881.1		5		IXI			5				
- - - 880.1		₩ ¥ 6		$V \setminus$	L						
- 550.1	LEAN CLAY stiff, brown and gray mottled, trace sand and gravel fill (CL)	- "	96	$\Lambda /$	17	1.5 B	3	35	6.3		
879.1	UW = 127.6 pcf SG = 2.70	7		X			3 2			12" Steel Casing installed	
				$V \setminus$			~			to 7 feet.	
—878.1 -		8 B	97		15	1.5 P	5	22	14.0		
- - 877.1		9		$ \chi $		F	7				
- -				$ /\rangle$			10				
876.1	LEAN CLAY hard, gray, trace gravel (CL)	10	98		13	6.5	10	12	84.0		
_ 875.1	IIIW = 00 and 60 a 76	1		V		S	7				
	UW = 99 pcf SG = 2.76			$ / \rangle$			8			Bottom of Excavation at 875.1 +/-	
- - - 874.1	Sand lens at 11.8 feet.	1:	99	$\left\langle \cdot \cdot \right\rangle$	15	NA	5	10	59.0		
- - - 873.1		1:	,	V			4 5				
0/3.1 	Sand lenses at 13.3 and 13.8 feet	WE'					6				
- 872.1		14	1 100	$\langle - \rangle$	14	1.9	6	10	5.0	-	
_				\mathbb{N}	` `	В	6				
871.1 		1!	5	M			5 6				
870.1	POORLY CRADED CAMP 4	1	6 101	<u> </u>	7	NP	0	ļ	0	1	
_	POORLY GRADED SAND medium to coarse grained, loose to medium dense, gray, trace	E	101	$\backslash /$	′	ואר	2				
869.1 	gravel, saturated (SP)	F1	7	X			7				
_ _ 868.1		E11	8	$\backslash \backslash$							
· · · · ·			102		1	NP	6	-	1.2		
867.1		1	9	IX.			11			}	
Ξ				$V \setminus$			''				
	VERSAR, INC.; 200 W. 22nd Stre	et: Suite 250:	Lomi	nard.	IL BO	148	: 63	0/26	8-859	 55	

VCINAI MC ENVIRONMENTAL RISK MANAGEMENT			T Field Boring Log					.og	Page2_ of2_			
	Project No. 3709.001 County Boo			ring No.	G-1-98				_ M o	nitor Well No.	·	
Project Nan	roject Name Enviro-Chem Superfund Site											
Surface Ele	Surface Elevation 886.1 Completion Depth 3			ger Det	oth	32	ft b	gs	_ Rot	tary Depth	ft bgs	<u>; </u>
	Quadrangle Rosston Sec T			Date: Start 1				3	_ Fini	ish2/2/	98	
JTM (or St Plane) Cool	ate rd. N.(X) <u>971799.9</u> E.(Y) <u>725</u>	948.4	Wa Dui	iter Lev ring Dri		z 6.0) ft b	gs	_ At	Completion _	z ft b	ogs
	39° 57' Longitude 86°											
	Boring Location Southern Concrete Pad Excavation Area			<u>_</u>	AMPLES						PERSONNEL Seologist - C. O'Neil	
	ipment and Method CME-75			. 8	(inches)		_	%	Вu	Driller -	Dave Ellis	
• .		Graphic Log Depth	Samole No.	Sample Type	Sample Recovery	ts#)	N Value (blows/6")	Moisture Content (%)	PID Reading (ppm)	Helper - Helper -	Justin	
Elevation	DESCRIPTION OF MATERIALS		Sam	Sam	Sam	Qp (tsf)	N S	Mois	PID (REI	MARK	s
=	POORLY GRADED SAND medium to coarse	=	10		5	NP	4	-	0			
865.1	grained, medium dense, gray, trace gravel (SP)	E 2	1	X			9					
-		E		/\			12					
-864.1 -		E 2	2 10)4	15	NP	3	-	0			
- -863.1		E 2	3	V			7 10					
<u> </u>		F		$ / \rangle$			10		'			
862.1		E 2	4 10	55	20	NP	4		0			
- - -861.1		E2	5	V			9					
- 001.11		E'		-1/			10					
860.1		-2	6 10	6	14	NP	6	-	0			
-		I I		-			7					
-859.1		-2	1	-1 \wedge	1		19					
858.1	Grading to sandy silt.	2	8 10) 7	11	NP	11		0			
-	Grading to buildy diff.	E E		$ \cdot $	` `		12					
— 857.1 - -		2	9	١X			13					
- - 856.1	LEAN CLAY very stiff to hard, brown and	3	0 10	<u> </u>	16	3.0	3	10	0	Disturbed Sa	mnlo	
<u> </u>	gray mottled, trace sand (CL)			"\\ /		P P	17	'		Disturbed 3a	mpie.	
 855.1		3	1	IX			16 25					
		3	2		1	1	1]		
=			2 10) " \ /	6	7.0 S	13 15	11	0			
853.1		₩ 3	3	IX			54					
 852.1		3	4	/ \		<u> </u>						
	Boring terminated at 34 feet and tremmie grouted with cement-bentonite grout.											
İ												

VERSAR, INC.; 200 W. 22nd Street; Suite 250; Lombard, IL 60148; 630/268-8555

Ve	Saling environmental risk ma	NAGEMENT	. 1	-1610) B	Orir	ıg L	.og		Page1 _ of2
	3709.001 County Boo			g No.		G-	2- <u>98</u>		_ Mo	nitor Well No. <u>MW-G</u>
oject Nam	Enviro-Chem Superfund Site		Site l	.ocati	ion .		<u>L</u>	JS 4	21, Z	ionsville, Indiana
ırface Ele	vation 885.1 Completion Depth	26.0 ft bgs	Auge	r Dep	th	24	ft b	gs	_ Rot	ary Depth <u>ft bgs</u>
	Rosston Sec. T.	_ R				1/2	9/98	3	_ Fini	sh <u>2/4/98</u>
「M (or Sta ane) Coor	ate rd. N.(X) <u>921737.8</u> E.(Y) <u>725</u> 9	941.9	Wate Durin			2 8.0) ft t	gs	_ At	Completion <u>T</u> ft bo
	39° 57' Longitude 86° 1									
	ation Southern Concrete Pad Excavation Area		-	_ S ,			ES_	· · ·		PERSONNE
] .	9	(inches)			:a	6	Geologist - S. Conway Driller - Dave Ellis
ming Equi	ipment and Method <u>CME-75</u>	Pic Pic Sign	S S	e T) (ery	£	ue s/6")	ure or tr	eadin	Helper - Justin
levation	DESCRIPTION OF MATERIALS	Graphic Log Depth	Sample No.	Sample Type	Sample Recovery	d (t	L Val	Moisture Content (%)	PID Reading (ppm)	REMARKS
	LEAN CLAY FILL with Sand medium stiff to		64	" /	6	.75		15	7.3	NEIVIANNO
884.1	stiff, brown, roots near surface (CL FILL)			V		В				
584.1		1		$ \Lambda $						
883.1	•	E 2	65		12	1.75		 	000 +	
				$\backslash /$	'-	P	3			
882.1		3		X			4			
881.1		1 4								
			66	N / I	16	1.6	4	15	127	
880.1		5		X			4 5			
				$/\setminus$			5			
879.1	SANDY CLAY stiff, dark gray (CL)	6	150		20	1.4 B	I	21	10	
878.1		7		V		6	4			12" Steel Casing installe
Ì	Sand lens with pebbles at 7.3 feet.			$ / \setminus$	1	l	5	 		to 7 feet.
877.1	CLAY soft to medium stiff, gray, trace sand	₩ 28	151		2	0.5	ST	25		
876.1	and gravel (CL) POORLY GRADED SAND coarse grained.	9				P				
870.1	loose, gray (SP)	E,								
875.1		<u>+</u> 10	152		4	NP	NA		NA	
		E .]	\mathbb{N}		'''				Bottom of Excavation at
-874.1		F 11		ľ						874.9 +/-
-873.1	LEAN CLAY stiff, gray, trace sand, little	12	2	$\langle \ \rangle$		4 -	<u> </u>	_		
	gravel (CL)		153	$\backslash /$	14	1.0 E	5	9	0	
-872.1	UW = 147 pcf	13	3	X		Ì	5			
-871.1 -		// //	,	$V \setminus$						
371.1	POORLY GRADED SAND medium to coarse grained, loose, gray, trace gravel (SP)	E'	154	1	14	NP	1 2	-	0	
-870.1	gramos, rosso, gray, trace graver (c),	19	5	l X			3			
				$V \setminus$			6			
-869.1		F 16	155	1	10	NP	1	-	0	
-868.1		E 17	7	1			5			
				$ /\rangle$			5			
-867.1	POORLY GRADED SAND with Gravel	18	156		18	NP	4	 -	0	Cc = 0.96
0664	medium to coarse grained, medium dense, gray (SP)	WF.		V			6 8			Cu = 7.5
-866.1		F 19	7	$ \Lambda $			7			
	Gravel lens at 19.8 feet	数位数位置	1	1/ \	1	I	1			

Ve	1.22	MENTAL RISK MA	NAGE	MENT		-ielc	1 B	orin	g L	.og		Page	2 of _	2	
			CountyBoo				g No.		G-2	2-98		_ Moi	nitor Well N	lo. <u>MW</u>	/-G2
Project Nan	ne	Enviro-Chem	Superfund Site			Site L	.ocati	on _		U	S 42	21, Zi	onsville, l	ndiana	
Surface Ele	vation	885.1	_ Completion Depth :	26.0 ft	bgs	Auge	r Depi	th	24	ft bo	ąs_	Rot	ary Depth	ft b	gs
Quadrangle	Rosstor	1 Se	s τ	_ R		Date:	Start	:	1/2	9/98	3	_ Fini	sh2/4	4/98	
UTM (or St	ate		E.(Y) 725			Wate	r Leve	el:					Completion		
			gitude 86° 1									- 			
			ad Excavation Area			<u> </u>	S	AM a	PLE	<u>:S</u>				RSONI	
_] .		Sample Recovery (inches)			<u>.</u>	6	Geologist - Driller -	Dave Ell	
Drining Equ	ilipment and i	Method <u>CME-75</u>		Pic Pic	ا گووئ	Sample No.	Sample Type	2	£	s/6")	Moisture Content (%)	PID Reading (ppm)	Helper -	Justin	
Elevation	DECCE	DIDTION OF	MATERIALS	Graphic Log	Depth (feet bgs)	gmes	amp	lecov	Op (tsf)	2 < S	Aoist Conte	PD R	Helper -	ENA A DI	VC
- Elevation		AY with Sand hard	MATERIALS , gray, trace			157			6.8			0		<u>EMARI</u>	NO
F 864.1	gravel (C	L)			Ē,		V		В	8 12					
864.1					<u> </u>		$ \Lambda $	ļ	ļ	21					
863.1	•				E 22	158	(-)	14	4.5+	6		0			
					Ε	1	$ \setminus / $		Р	10					
862.1					<u> </u>		ΧI			13 14					
861.1		Sand lens at 23.	6 feet.		_ 24	159						0			
						159	NA	18	•	7 13	•	U			
860.1					_ 25		X			14 16					
859.1					E 26		V V								
859.1		rminated at 26 fee			_ 26)									
	giodica	With coment bento	into groot.												
<u> </u>															
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PROJECT TITLE ENVIRO-CHEM BORING NO. G-2-98 WELL NO. G-2 LOCATION ZIONSVILLE, IN DATE STARTED 1-29-98 COMPLETED 1-29-98 DRILLING CONTRACTOR PHILIP ENVIRONMENTAL DRILLER DAVE ELLIS RIG No. CME-75 METHOD HSA FLUIDS NONE GEOLOGIST STEVE CONWAY, HANDEX COMMENTS N 921,799.89, E 725,948.40 PROTECTIVE RISER CAP TOP OF CASING ELEVATION 887.3 APPROXIMATE EXISTING GROUND SURFACE EL.885.12 MSL KKK KKK KKK KKK VALATI VALATARIA (ALATARIA) PLUG 12" DIA. BENTONITE/CEMENT STEEL CASING **BOREHOLE** DIAMETER BENTONITE SAND - BOTTOM OF BORING WELL CONSTRUCTION NOTES: 1. TYPE RISER ABOVE W.T. 2" PVC 2. TYPE RISER BELOW W.T. 2"# PVC RISER STACK MONITORING WELL 3. TYPE OF SCREEN 0.010" CONT. SLOT PVC

MSL.

INSTALLATION DIAGRAM



NOT TO SCALE

3. TYPE OF PROTECTIVE CASING STEEL 4. ELEVATION OF WATER 878.13 FT

5. WATER LEVEL READING ON 9.0 FT BELOW TOC FEB 24, 1998

VC	NO INC. ENVIRONMENTAL RISK MA	NAGEMENT		Field	d B	orir	ng L	-og		Page1 of2_
	3709.001 County Boo			g No.		G-	3- <u>98</u>	l	_ M o	nitor Well No.
Project Nam	ne Enviro-Chem Superfund Site		Site I	.ocati	ion .			JS 4:	21, Z	ionsville, Indiana
Surface Ele	vation885.2 Completion Depth	34.0 ft bgs	Auge	r Dep	th	32	ft b	gs	Rot	tary Depth ft bgs
	Rosston Sec T									
JTM (or Sta	ate		Wate	r Lev	el:					
	rd. N.(X) 921664.5 E.(Y) 725				ling <u>Z</u>	2 9.0) ft t	ogs	_ At	Completion <u>T</u> ft bgs
Latitude	39° 57' * Longitude 86° 1	6'		S	ΑM	PLI	ES			PERSONNEL
Boring Loca	ation Southern Concrete Pad Excavation Are	a			185)					Geologist - C. O'Neil
Drilling Equi	ipment and Method <u>CME-75</u>		نے ا	γρε	(inches)		-	<u> </u>	9	Driller - Dave Ellis Helper - Justin
		phic sth	Sample No.	Sample Type	Ple V	tsf)	alue vs/6	ture	Read (Helper - Justin Helper -
Elevation	DESCRIPTION OF MATERIALS	Graphic Log Depth (feet bgs)	Sam	Sam	Sample Recovery (Op (tsf)	N Value (blows/6")	Moisture Content (%)	PID Reading (ppm)	REMARKS
	LEAN CLAY With Sand stiff to very stiff,	////E	10	1	4	1.0	1	21	0	
884.2	brown to brown and gray mottled, trace gravel and brick fragments (CL-FILL)			V		Р	2			
- 884.2	graver and blick fragments (CE FIEE)	1 T		$ \Lambda $			1			
	•	///E 2						10		
=			11	N / I	9	1.5 P	3	18	0	
882.2		3		ΙXΙ			2			
_	UW = 131 pcf SG = 2.72		İ	$ / \setminus $			4			
881.2		4	12		12	2.0	1	21	2.7	
=				$ \setminus $		₽	4			
880.2		5		M			5			
E 879.2		€ 6								
E "			13	$\Lambda \Lambda$	20	1.9 B	2 2	21	26	
878.2	SANDY SILT stiff, gray, trace organics (ML)	7		ΙX		_	2			12" Steel Casing installed
	UW = 129 pcf SG = 2.64			$ / \setminus$			3			to 7 feet.
877.2	POORLY GRADED SAND loose, fine to	8	14	$(\ \)$	16	NP	1	18	-	1
Ē.	medium grained, brown (SP)	E.		$ \setminus $			2 2			
876.2		₩ 9		ľ			4			
875.2	LEAN CLAY very stiff to hard, brown and	10		$V \setminus$						
= 0,3.2	gray mottled (CL) UW=138 pcf SG=2.74		15	N /	20	4.1 B	10	13	20.6	
874.2	Grades with isolated sand streaks and	E 11		ĺΧ			11		Ì	
E 1	lenses.			$ /\rangle$			12	ļ	1	Bottom of Excavation at 874.1 +/-
873.2	SANDY CLAY/CLAYEY SAND very stiff,	12	16	$\langle \cdot \rangle$	20	2.2	4	9	8.3	
E	gray, trace gravel (CL/SC)			\/		S	6			
		13		ľ			9			
- - - 871.2	Sand lense at 13.5 feet	14		/ /						
E ", " [LEAN CLAY with Sand very stiff to hard, gray, trace gravel (CL)	////	17	Ν7	20	5.3 B	5 8	9	19	
870.2	g.o., trace graver (CL)	15	;	ΙX			11			
=	Sand lens at 15.5 feet	<i>/////</i> E		$ /\rangle$			11			
869.2	UW = 150 pcf	16	18	$\langle - \rangle$	16	4.5+	-	 - -	18	-
				$ \setminus $		Р				
868.2		17		ΙĂ						
- 867.2		18	L	V]
307.2		W/F 18	19	/	10	2.9 B	4	11	1.8	
866.2		E 19	,	IV			6	1		
1 000.Z I										
- 300.2 -	UW = 144 pcf			$ /\rangle$			9			

VC	MC ENVIRONMENTAL RISK MA	NAGE	MENT	. !	-1610	ם א	orın	g L	.og		Page	<u>2</u> of _	2
	3709.001 CountyBoo				g No.		G-3	<u> 98</u>		_ Mo	nitor Well N	ło	
Project Nan	Enviro-Chem Superfund Site			Site L	.ocati	on .		<u> </u>	S 42	21, Z	ionsville,	Indiana	
Surface Ele	vation 885.2 Completion Depth	34.0 ft	<u>bgs</u>	Auge	r Dep	th	32	ft b	as_	_ Ro1	ary Depth	ft b	gs
Quadrangle	Rosston Sec. T.	_ R		Date:	Start	·	1/2	3/98	3	_ Fin	ish1/2	26/98	
UTM (or St Plane) Cooi	ate d. N.(X) <u>921664.5</u> E.(Y) <u>725</u>	<u>941.5</u>		Wate Durin	r Leve g Drill	el: ling <u>Ş</u>	z 9.c	ft b	gs	_ At	Completion	<u>▼ f</u> f	t bgs
Latitude	39° 57' * Longitude 86° 1	<u>6 ·</u>			9	<u>Λ Ν Λ</u>	PLI				PE	RSONI	NICI
	ation Southern Concrete Pad Excavation Area					(88)						- C. O'Ne	
Drilling Equ	ipment and Method CME-75	<u> </u>		ا نے ا	γρe	Sample Recovery (inches)		_	€	6 Li	_	Dave Ell	
		Graphic	Depth (feet bgs)	Sample No.	Sample Type	ple	(tsf)	alue ws/6	Moisture Content (%)	PID Reading (ppm)	Helper - Helper -	Justin	
Elevation	DESCRIPTION OF MATERIALS	78 3	De 5	Sar	San	San Rec	Ωp	N (B)	Moi	Old (ppr	R	EMAR	KS
E	LEAN CLAY with Sand very stiff to hard, gray, trace gravel (CL)			20	\setminus	18	3.8 B	7	13	8.3			_
864.2	g.c.,,		21		X			12 16					
E			Ė		$V \setminus$			10					
863.2 	Sand lens at 22 feet		— 22 —	21	7	20	4.5 B	10 14		0.8			
862.2			E 23	3	ΙXΙ			11			ĺ		
E	POORLY GRADED SAND medium to coarse	<i>\\\\\</i>	E		$ / \setminus$			16					
861.2	graded, medium dense gray (SP)		<u> </u>	22		20	4.4		11	1.3			
860.2	LEAN CLAY with Sand very stiff to hard, gray (CL)		_ _ 25	5	$ \chi $		В	15 20					
F	gic, (cz.)				$ /\rangle$			24					
859.2			_ 26	23	$\langle \cdot \rangle$	17	7.02	17	11	1.3	1		
858.2			E 27	,	$ \bigvee $		S	18 23					
E 330.2			= "		$ \Lambda $			34					
857.2			28	3 24	$\langle - \rangle$	22	10.5	10	10	2.4			
E			E 29		V		s	21 25					
<u></u> 856.2			E	'	$ \Lambda $			47					
855.2	Grades to LEAN CLAY		30	25	$\langle - \rangle$	12	4.5+	20	12	6.1	-		
E			ŧ		$ \bigvee$		Р	50 50/4					
854.2			31		$ \Lambda $			p0,4					
853.2	SILT hard, gray, with interbedded clay		£ 32	2 26	$\langle - \rangle$	12	4.7	47	7	<u> </u>	-		
	streaks (ML)		Ė.		\mathbb{N}		S	43					
-852.2 -			<u>-</u> 33	3	M		!	50 0/3.	 5				
851.2	Boring terminated at 34 feet and tremmie	ЩЩ	E 34	1	<u> </u>	<u> </u>				<u> </u>	_		
	grouted with cement-bentonite grout.												
								L_	L				

VC	NO ENVIRONMENTAL RISK MA	NAGEMEN	Т	riei	a B	orır	ıg L	.og		Page1 _ of2
	3709,001 County Boo			ng No.	·	G-4	<u> 4-98</u>		_ Mo	nitor Well No.
roject Nar	ne Enviro-Chem Superfund Site		Site	Locat	ion .		<u> </u>	S 4:	21, <u>Z</u>	ionsville, Indiana
urface Ele	evation884.4 Completion Depth	24.0 ft bgs	Aug	er Dep	th	22	ft b	gs _	_ Rot	tary Depthft bgs
	Rosston Sec T									
M (or St	ate		Wat	er Lev	el:					
	rd. N.(X) 921605.7 E.(Y) 725								- At	Completion <u>▼ ft bg</u>
titude	39° 57' " Longitude 86° 1	6		S	ΑM	PLI	ES			PERSONNE
ring Loc	ation Southern Concrete Pad Excavation Are	<u>a</u>	-		Sample Recovery (inches)					Geologist - Steve Conw
rilling Equ	ipment and Method <u>CME-75</u>	[₀]	<u>.</u>	Sample Type	(i)		ũ	_ €	guig	Driller - Dave Ellis Helper - Justin Helper - REMARKS
		Graphic Log Depth	Sample No.	a dr	over 1	(tsf)	alue ws/6	sture	Hea (E	Helper -
levation	DESCRIPTION OF MATERIALS	؞ڴٳڎٷ	San	San	San	ð	2 S	ຂຶ້ ວິ	₽ <u>@</u>	REMARKS
	LEAN CLAY FILL with Sand medium stiff to		79	17	15	2.0 P	1 3	16	0.5	
883.4	stiff, brown to gray, trace gravel (CL-FILL)	////		V		_	2			
1				$ /\rangle$			2			
882.4	•		80	$\left\langle \cdot \cdot \right\rangle$	8	.75	1	16	0.5	
		//// E		$ \cdot $		В	1			
881.4		//// E:	3	X			1 2			
880.4			L	V						
aau. 4		<i>WE</i> .	81		9	1.0 P	1	17	3.3	
879.4		//// E !	5	IX		,	2			
	Gravel lens at 5.5 feet			/			1			
878.4	CLAY stiff, gray, trace sand and gravel (CL)	/////-	3 20	(16	1.2	2	39	15.6	-
				$ \cdot $		В	2			
877.4			7				3			12" Steel Casing installe
876.4	TAIRVEV TRANSCERENCE FOR THE PART OF T	<i>###</i> E.	3 2	/\						to 7 feet.
5,0.4	CLĀYEŸ SĀND medium dense, gray (SC) UW = 120.6 pcf SG = 2.754		20:	2	12	.3	ST	25		
875.4	Sand lens at 8.5 feet.		9			<u> </u>				Bottom of Excavation at
										875.3 + /-
874.4	UW = 147 pcf SG = 2.802	1	0 20	3 ,	17	4.5+	2	12	256	1
	Grades with little gravel	//// .		V		Р	5			
873.4	POORLY GRADED SAND fine grained,	[]	1		•		14			
872.4	medium dense, brown (CL)	E ₁	2 20	<u>/</u>	1.0	l bio	-	10	104.8	
			204	' \ /	16	NP 4.5	5	10	104.8]
871.4	LEAN CLAY hard, gray, trace sand and	1	3	X		P	20 24	}		
	gravel (CL)			$\backslash \backslash$			~~	[
870.4		//// =1	4 20	5	18		11	9	12.6	1
869.4	66.4	////E	5	V		NP	17			
	GS Analysis						21			
-868.4		1	6 20	6 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	18	5.0	12	9	10.6	-
]\/		P	14			
867.4	SAND fine grained, loose to medium dense,	¥1	7	IX			15			
000 :	brown (SP)	WE.		\ \	$\sqrt{}$					
-866.4		₩F	8 20	7	16	5.0	1	9	8.6	
-865.4	LEAN CLAY hard, gray, trace sand and	1	9	V		P NP	10			
	gravel (CL) SAND fine grained, loose to medium dense,			$ / \rangle$			11			
	Onital file grained, loose to mediam dense,			<u> </u>	<u> </u>	<u>L</u>	<u> </u>		1	

Ve	MC ENVIRONMENTAL RISK N	IANAGEN	MENT	, t	-ielo	3 80	orır	ıg ı	.og		Page _	<u>2</u> of	<u> </u>
	3709.001 County B				g No.		G-4	<u>4-98</u>		_ Mo	nitor Well I	No	
Project Nan	ne Enviro-Chem Superfund Site			Site L	_ocati	ion _			IS 4:	<u>21, Z</u>	ionsville,	Indiana	
Surface Ele	vation 884,4 Completion Dept	h <u>24.0 ft</u>	bgs	Auge	r Dep	th	22	ft b	gs	_ Rot	tary Depth	ft	bgs
Quadrangle	Rosston Sec. T.	R		Date:	Star	t	1/3	1/98	3	_ Fin	ish2/	5/98	<u>.</u> -
UTM (or St Plane) Cool	ate rd. N.(X) <u>921605.7</u> E.(Y) <u>72</u>	<u>5933.4</u>		Wate Durin			<u> 17.</u>	O ft	bgs	_ At	Completion	<u> </u>	ft bgs
.atitude	39° 57' Longitude 86°	16 '			_	AM	DI I	<u> </u>			DE	RSON	INIEI
	ation Southern Concrete Pad Excavation A				3,	8	r Li			<u> </u>	Geologist		
	ipment and Method CME-75			ا ہے ا	ype	Sample Recovery (inches)		_ ا	ŝ	ig G	1	Dave	Ellis
		Graphic Log	Depth (feet bgs)	Sample No.	Sample Type	ple overy	(tst)	alue ws/6	sture tent (PID Reading (ppm)	Helper - Helper -	Justin	1
Elevation	DESCRIPTION OF MATERIALS		Dep	Sam	Sam	Sam	පි	2 g	S S	등할	R	EMAI	RKS
=	brown (SP)	7	=	208		17	5.0 P	5	10	6.5			
-863.4	LEAN CLAY hard, gray, trace sand and gravel (CL)		_ 21		lΥ		'	10			1		
					$/ \setminus$			15					
-862.4			<u> </u>	209	$\langle \cdot \rangle$	24	5.0	1	10	14.6			
861.4			_ 23		IV.		P	12					
			= 1					9	1		[
860.4	Boring terminated at 24 feet and tremmie	_/////	_ 24	-	<u> </u>			-		-	-		
	grouted with cement-bentonite grout.												
											1		
											1		
						i					1		
								ļ					
			ļ				ļ						
L	VERSAR, INC.; 200 W. 22nd St	eet. Suite	250-	Lomi	hard	II RI	149	1: 63	0/26	8-854	55		

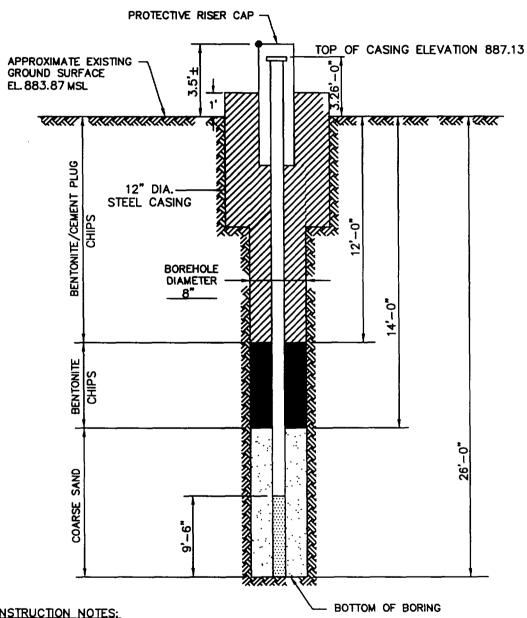
VC	HC ENVIRONMENTAL RISK MA	NAGE	MENT	. F	-ielo	d B	orin	ıg L	.og		Page1_ of2
	3709.001 County Boo				g No.		G-!	5- <u>98</u>		_ Mo	nitor Well No.
Project Nan	ne Enviro-Chem Superfund Site			Site L	.ocati	ion _		Ļ	JS 4:	21, Z	ionsville, Indiana
Surface Ele	vation 886.6 Completion Depth	36.0 ft	t bgs	Auge	r Dep	th	32	ft b	gs_	_ Ros	tary Depth <u>ft bgs</u>
Quadrangle	Rosston Sec. T.	_ R		Date:	Star	t	1/3	1/98	3	_ Fin	ish2/5/98
UTM (or St				Wate	r Lev	el:					
	39° 57' " Longitude 86° 1										
					S	AM	PLI	ES		·	PERSONNEL
	ation Southern Concrete Pad Excavation Area	<u>. </u>			9	nche		N Value (blows/6")	_		Geologist - Steve Conway Driller - Dave Ellis
Drilling Equ	ipment and Method <u>CME-75</u>	ည်	ر (Sg	Sample No.	Sample Type	e Bry (i	-	(e_)	% (%	PID Reading (ppm)	Helper - Justin
	DECORPTION OF MATERIAL C	Graphic	Depth (feet bgs)	ampt	ampl	amplecov	lp (ts	Valu	foist.	E R	Helper -
Elevation	DESCRIPTION OF MATERIALS SANDY CLAY FILL very stiff to hard, brown	<i>W.M.</i>		76		9	2.0	3	13	0	REMARKS
	to brown and gray mottled, trace gravel,				$\setminus / $		Р	2			
885.6	brick and ash (CL-FILL)		F 1		Ň			2			
884.6			E 2			4-	0.0		•		
			Ē	77	$\Lambda /$	17	3.0 P	3 5	14	0	
883.6			<u></u> 3		X			9			
E			= .		$V\setminus$			' '			
882.6			F *	78	7	22	4.5	4 8	11	3.4	
881.6			<u> </u>		ΙX			10			
[F			=		$ / \setminus$			10			
880.6			= 6	110		24	1.6	8	11	205	
879.6			£ 7		V		S	7 8			
[E°/3.0	CLAY very stiff, brown and gray mottled (CL)		E '		$ \Lambda $			7			12" Steel Casing installed to 7 feet.
878.6			<u>}</u> 8	111	_\	24	3.2	ST	11	NA	<u> </u>
	Sand lens at 8.5 feet.		=								
877.6	UW = 144.2 pcf SG = 2.80		₹ 9								
876.6			£ 10)							
			£ .	1112	N/	16	3.1 B	4 5	11	0.6	Bottom of Excavation at 875.8 +/-
875.6			- 11		X		 	7			875.8 47-
874.6			£.,		$V\setminus$						
E "4.0	SAND CLAY very stiff, gray (CL)		12 E	113	\ /	19	3.5 P	5 5	10	0.6	
873.6	Fine GRAVEL lenses at 13.1 and 14 feet.		<u>=</u> 13	3	ΙX			5			
l E	THE STATE ISINGS BY 10.1 and 14 feet.		E		$/ \setminus$	3		7			
872.6	SILTY SAND loose, gray, trace gravel (SM)		14	114	1	16	NP	4	15	0.0	-
871.6			<u> -</u> 15	5	V			4		1	
E	Gravel layer at 15.5 feet.		E		$ / \setminus$			3			
870.6	•		- 16	115	(-)	12	 -	4	8	0.0	-
E			E.	,	IV		2.5	4 7			
869.6	SANDY CLAY medium stiff, gray (CL) Sand lens at 17.3 feet		17	'	$ \Lambda $		P	13			
868.6	POORLY GRADED SAND loose to medium		£ 18	116	<u>{ </u>	15	NP	1	10	1.3	
1 E	dense, medium to coarse grained, gray,		E					3		".3	
867.6	trace gravel (SP)		<u>-</u> 19	9	IX			6	-		
E			E_		V		L	<u>L</u>	<u></u>		

VC	HC ENVIRONMENTAL RISK MA	NAGEME	NT	r	·ieic	3 B	orin	ıg L	.og		Page2	of <u>2</u>
	3709.001 County Boo				g No.		G-!	5-98		_ Mo	nitor Well No	•
Project Nam	ne Enviro-Chem Superfund Site		_	Site L	ocati	on .		Ų	S 4:	21, Z	ionsville, In	diana
Surface Ele	vation 886.6 Completion Depth	36.0 ft bo	<u> 15</u>	Auge	r Dep	th	32	ft b	gs	_ Rot	tary Depth _	ft bgs
Quadrangle	Rosston Sec T	R		Date:	Start	t	_1/3	1/98	3	_ Fin	ish2/5	/98
UTM (or St	ate rd. N.(X) 921819.7 E.(Y) 725			Water	r Levi	el:						
	39° 57' Longitude 86° 1											
				<u> </u>	<u>S</u> ,	AM	PLI	ΞS				SONNEL
	Southern Concrete Pad Excavation Are	<u>a</u>	_			Sample Recovery (inches)			_			Steve Conway Dave Ellis
Drilling Equ	ipment and Method <u>CME-75</u>	۽ ا	ŝ	Sample No.	Sample Type	(<u>;</u>	£	(.9/	are at (%	PID Reading (ppm)	Helper -	Justin
	5500007101105	Graphic Log Depth	(feet bgs)	ampt	d E	ampl ecov	Op (tsf)	Valu	loist. onte	D Re	Helper -	
Elevation	DESCRIPTION OF MATERIALS POORLY GRADED SAND medium to coarse		=	117	\ \	12	NP	3	≥ ບ 15	0.0	KE	MARKS
	grained, medium dense, gray, trace gravel	I E			\ /	-		5				
865.6	(SP)		21		Χl			7				
_ 864.6		E	22		$/ \$							
- 804.0		F	22	118	\setminus	13	NP	3 5		0.0		
863.6			23		χl			8				
_		I E			$/ \setminus$			9				
862.6			24	119	()	15	NP	3		0.0	1	
- 861.6		E	25		V			7				
- 801.8		F	25		Λ			11				
860.6		I E	26	120	$\langle - \rangle$	16	NP	6		0.0	-	
_		F		120	$\setminus /$,,,	INF	7		0.0		
859.6		F	27		X			8 13	ĺ			
858.6		F	20		$/\setminus$							
858.6 		F	20	121		13	NP	3 6		0.0		
 857.6		K E	29		X			9				
Ξ Ι		F			$/\backslash$			10				
856.6			30	122	()	16	NP	7	 	0.0	1	
855.6		F	31		V			9 7				
		E	31		$ \Lambda $			12				
854.6		N/E	32	123	$\langle - \rangle$	15	NP	6		0.0	1	
<u> </u>		E		1	$\backslash /$.	"	8		3.5		
853.6 		E	33		X			13				
 852.6		XE	34		/ \							
		E	5 7	124	N /	24	NP	3		0.0		
851.6			35		X			6				
		E			$V \setminus$			9	-		į	
— 850.6	Boring terminated at 36 feet and tremmie		36								1	
	grouted with cement-bentonite grout.						1					
		1 1										

	NO ENVIRONMENTAL RISK	MANAGEMEN	T			••••	.9 .	- • 9		Page1 of2_
	3709.001 County			ıg No.		<u>G-</u>	6-98		_ Mo	nitor Well No. <u>MW-G6</u>
Project Nan	ne Enviro-Chem Superfund Si	e	Site	Locati	ion .			JS 4:	21, Z	ionsville, Indiana
Surface Ele	vation 883.9 Completion De	pth <u>27.0 ft bgs</u>	Auge	r Dep	ith _	25	ft b	gs	_ Rot	tary Depth ft bgs
Quadrangle		R	Date	: Stan	t	1/2	9/9	3	_ Fini	ish <u>2/4/98</u>
UTM (or Sta			Wate	r Lev	el:					Completion <u>▼ ft bgs</u>
	39° 57' Longitude 86°		<u> </u>	_	AM		ES_	r		PERSONNEL
Boring Loca	ation Southern Concrete Pad Excavation	Area	-		ches					Geologist - Steve Conward Driller - Dave Ellis
Drilling Equ	ipment and Method <u>CME-75</u>	<u>.</u> .	g g	Sample Type	Sample Recovery (inches)	_	[6]	98	PID Reading (ppm)	Helper - Justin
		Graphic Log Depth	Sample No.	elqn.	mple	(tsf	Value ows/	nten	3 % E	Helper -
Elevation			S S	Sa	S &	_ 	zΘ	Σိပိ	<u>z</u> <u>s</u>	REMARKS
<u> </u>	7" CONCRETE above limestone subbase.	4.4.1								
882.9			1 67	Ļ.,	6		-	15		
- -		12 A E	"	$\backslash /$			4			
881.9	SILTY CLAY FILL gray and brown, trace		2	X			2			
<u>:</u>	sand and gravel (CL-ML FILL)			$/ \setminus$			-			
-880.9 -	LEAN CLAY with Sand stiff to very stiff,		3 68	()	16	-	5	11	175	
- - -879.9	brown to brown and gray mottled, trace gravel (CL)		.	V			9			
879.9 -	9.210. (02,		•	lΛ			12			
878.9	Sand lenses at 4.9 and 5.6 feet		5	$\langle - \rangle$						
-			69	N/	20	2.4 S	5	12	-	
- 877.9			5	ΙX		_	7			
-				$ / \rangle$			9			
- 876.9			7 160	(-)	15	2.6	3	13	11.0	12" Steel Casing installed
				$ \setminus /$		В	4 5			to 7 feet.
875.9			В	ľ			7			
_ 874.9			9	<u> </u>						Bottom of Excavation at 875.2+/-
6/4.3 	LEAN CLAY very stiff, gray, trace sand and gravel (CL)		161		18	3.0 B	4	9	1.0	
_ 873.9	graver (CL)		0	ΙV			8			
=				$ /\rangle$			8			
- 872.9		<i>₩</i>	1 162		24	1.8	ST	11	NA	-
-	104-1427-400-007	<i>/////</i> E			- '		-			
871.9	UW = 143.7 pcf SG = 2.67		2							
=	Grades with interbedded SAND lenses.	<i>₩</i> .			· '					
870.9 			163	1	15	1.7	2	12	0.0	1
- 869.9			4	IV.			3			
_						NP	5			
868.9		//// =1	5 164	<u> </u>	16	1.3	2	12	0.0	4
=	Sand lens at 15.3 feet.			$] \setminus /$			3			
867.9			6	X			5			
		//// E.	ا ر	$V \setminus$						
866.9 			165	1	18	1.3		-	0.0]
_ 865.9		<i>/////</i> E.	8	V			3 2			
				$ \wedge $			6			
									1	i .
 864.9	POORLY GRADED SAND medium to coars		9 166		14	NP	3	+-	0.0	1

plate ID:EEPA\gint project ID:\Versar project no:\\vun date:3/10/98							<u> </u>	<u> </u>	Ñ		<u>ק</u>
	- 856.9 		859.9	-861.9 -860.9	-862.9	Drilling Equ	Boring Loc	Quadrangle UTM (or St Plane) Coo Latitude	Surface Elevation	Project Name	Project No.
	Boring ten grouted w				POORLY of grained, m (SP)	Drilling Equipment and Method Elevation DESCRIPTI	Sou	Quadrangle Rosston UTM (or State Plane) Coord. N.(X) Latitude 39° 57	vation		
	Boring terminated at 27 feet and trem grouted with cement-bentonite grout.				POORLY GRADED SAND grained, medium dense, g (SP)		nern Concr	921433.4	883.9	Enviro-	3709.001
	27 feet and tremmie bentonite grout.				ND medium to coars e, gray, trace gravel	1 11 1-	e	Sec	ි 	Enviro-Chem Superfund Site	9.001 County Boone
	tremmie rout.				to coarse ce gravel	MATERIAL	cavation A	T	Completion Depth	erfund Site	Y
						Graphic Log	vrea	R 25907.8	27.0		Boone
	27	26 26				Depth (feet bgs)		.	ft bgs		
		169		8	167	Sample No.		Date: Start Water Level: During Drilling	Auger Depth	Site Location	Boring No.
		$\geq \leq$	$\geq \leq$		\times	Sample Type	\¢	Start Leve Drilli	Dept	ocatio	Z
		13			7	Sample Recovery (inc	hes)	 42 		Š	
		푹		 	₹	Op (tsf)	`	1/29 4.0	25 1		G-6-98
		19 13 1 6	14 1 8 7	14 7	ω α α	(blows/6") Moisture	\c	1/29/98 ¥ 4.0 ft bgs	25 ft bgs	US	98
						Content (%)	_	S	"	421	
		0.0		3	00	PID Reading (ppm)		Finish At Cor	Rot	r :	<u>X</u>
						Helper - Helper -	PER Geologist -	불	Rotary Depth	Zionsville, Indiana	Monitor Well No.
						Dave Ellis Justin REMARKS	PERSONNEL gist - Steve Conway	2/4/98 ion X f	ft bgs	(E. 1	MW-GA
							š Z	ft bgs	SEC		<

PROJECT TITLE ENVIRO-CHEM WELL NO. G-6 BORING NO. G-6-98 DATE STARTED 1-29-98 LOCATION ZIONSVILLE, IN COMPLETED 1-29-98 DRILLING CONTRACTOR PHILIP ENVIRONMENTAL DRILLER DAVE ELLIS RIG No. CME-75 METHOD HSA FLUIDS NONE GEOLOGIST STEVE CONWAY, HANDEX COMMENTS N 921,733.40, E 725,907.76



WELL CONSTRUCTION NOTES:

- 1. TYPE RISER ABOVE W.T. 2" PVC
- 2. TYPE RISER BELOW W.T. 2" PVC
- 3. TYPE OF SCREEN 0.010" CONT. SLOT PVC
- 3. TYPE OF PROTECTIVE CASING STEEL
- 4. ELEVATION OF WATER 878.35 FT MSL.
- 5. WATER LEVEL READING ON 8.95' FT BELOW TOC FEB 24, 1998

RISER STACK MONITORING WELL INSTALLATION DIAGRAM



	MC ENVIRONMENTAL RISK MA	NAGE	MENT	•				.9 -	3		Page _ 1 _ of _ 2
	3709.001 CountyBoo				g No.		G-	7-98		_ Mo	nitor Well No.
Project Nam	ne Enviro-Chem Superfund Site			Site L	.ocati	on .			<u> 15 4:</u>	21, Z	ionsville, Indiana
Surface Ele	vation 883.8 Completion Depth	31.0 ft	bgs	Auge	r Dep	th	29	ft b	gs	_ Rot	tary Depth <u>ft bgs</u>
Quadrangle	Rosston Sec T	R		Date:	Start	·	1/3	0/98	3	_ Fin	ish2/3/98
UTM (or Sta	ate d. N.(X) 921668.8 E.(Y) 725			Wate	r Leve	el:					Completion ▼ ft bgs
	39° 57' Longitude 86° 1				-						
	ation Southern Concrete Pad Excavation Are				S	MA	PLI	ES			PERSONNEL
-		<u>a</u>				nche.			_	PID Reading (ppm)	Geologist - Steve Conwa Driller - Dave Ellis
Drilling Equi	ipment and Method <u>CME-75</u>	Σįς	لا (sg	Sample No.	Sample Type	: 5	æ	.9/	8 ±	adin	Helper - Justin
	DECODIDETION OF MATERIAL O	Graphic Log	Depth (feet bgs)	ampl	ampl	amp ecov	ıp (ts	Val.	loist. onte	ID Re	Helper -
Elevation	DESCRIPTION OF MATERIALS 10" CONCRETE floor slab over crushed	44		S	v)	S &	0	ZE	≥ 0	4 3	REMARKS
Ε	limestone subbase.	12.0	⊢								
882.8		4.4.	E 1	70		4	NA	l	-	185	
= 	•	4.4	2		V			3			
=		44	E		$ \Lambda $			9			
880.8	LEAN CLAY FILL very stiff, brown, trace	10.0	_ з	71	$\langle - \rangle$	18	2.4	5	16	81	
E	gravel (CL)		E		\setminus / \mid		В	6			
879.8	SAND FILL medium to coarse grained,	<i>Y</i>	- 4		X			7 8			
878.8	medium dense, brown (SP-FILL)		5		$\langle \ \ \rangle$						
E ", ", [LEAN CLAY with Sand very stiff, gray, trace gravel (CL)		E,	72	\setminus	16	2.1 S	3 7	14	162	
877.8	Orange staining at 5.0 feet		6		X			7			
E			E		$/ \setminus$			11			
876.8			7	138		18	3.3	1	11	78	12" Steel Casing installed
875.8			- - 8		\bigvee		В	5 6			to 7 feet.
E 373.3			E					8			
874.8			9	139	\	24	4.0	ST	11	NA	
E	UW = 143.7 pcf SG = 2.69		Ē						' '		Bottom of Excavation at
873.8			10	<u>'</u>							874.2 +/-
872.8			<u> </u>								
E "			ŧ ''	140	N /	20	2.5	3	9	1.3	
871.8			12	2	X			4			
E [1		//			6			
870.8	POORLY GRADED SAND fine grained, loose, gray (SP)		<u> </u> 13	141	7	17	NP	4	10	1.3	-
869.8			E 14		IV			4 4			
E			E		$ /\rangle$			7			
868.8	LEAN CLAY with interbedded sand lenses,		15	142	$\left\langle -\right\rangle$	15	NA	2	10	0.0	-
	very stiff to hard, gray (CL)		=		$ \setminus /$			4 8			
867.8			16	9	$ \Lambda $			6			
866.8			走 17	,	<u> </u>	1-	1 -	1	-	100]
F			E	143	$\backslash /$	15	4.5 P	7	12	0.0	
865.8	DOODLY OD 1 DE 2		¥18	3	X			8			
E	POORLY GRADED SAND medium to coarse grained, medium dense, gray, trace gravel		E		//			8			
864.8	(SP)		- 19 -	144	∇	12	NP	4 5	11	0.0	1
			•								i .

\lceil	Ve	Sal MC ENVIRONMENTAL RISK MAI	NAGEMEI	NT	F	ielo	B	orin	g L	.og		Page	2 of 2	<u> </u>
		3709.001 County Boo				No.		G-7	7-9 <u>8</u>		_ Mo	nitor Well N	o	_
1	Project Nam	ne Enviro-Chem Superfund Site		_	Site L	ocati	on _		<u> </u>	S 4:	21, Z	ionsville, l	ndiana	_
	Surface Ele	vation 883.8 Completion Depth 3	31.0 ft bg	<u> </u>	Augei	Dept	th	29	ft bo	as_	_ Rot	ary Depth _	ft bgs	_
	Quadrangle	Rosston Sec. T.	R	_	Date:	Start	:	1/3	0/98	3	Fini	ish 2/3	3/98	_
	UTM (or Sta	ate d. N.(X) <u>921668.8</u> E.(Y) <u>725</u> 9			Water	r Leve	el:							_
	Latitude	39° 57' " Longitude 86° 10	6 <u> </u>	•	r—	<u> </u>	Λ R A	PLE				DEC	RSONNEL	٦
		ition Southern Concrete Pad Excavation Area			<u> </u>		<u>§</u>		-3				Steve Conway	1
Ì		ipment and Method CME-75		_	6	ød.	Sample Recovery (inches)		٦	%	<u>ق</u>		Dave Ellis	Ì
Ì			Graphic Log Depth	(feet bgs)	Sample No.	Sample Type	ole y	Op (tsf)	N Value (blows/6")	sture tent (PID Reading (ppm)	Helper - Helper -	Justin	Ì
	Elevation	DESCRIPTION OF MATERIALS	2 2 g	166	Sam	Sam	Rec	ð	2 g	Con	면 g	RE	MARKS	1
	E	POORLY GRADED SAND medium to coarse grained, medium dense, gray, trace gravel	E			\bigvee			8 5					1
	862.8	(CL)	 	21	145	(\cdot)	13	NP	10	11	0.0			
	E		XE.	22		\bigvee			12 12					
	861.8		₩E'	22		Λ			9					
	860.8	LEAN CLAY with Sand hard, gray, trace		23	146	$\left\langle -\right\rangle$	14	7.7	6	9	0.0			
	E	gravel (CL)		~ 4		\bigvee		В	10 11					
	859.8 			24		Λ			15					
	858.8			25	147	$\left\langle -\right\rangle$	17	7.3	5		0.0			
١	E]	\bigvee	.,	В	11		0.0			1
	857.8 			26		ΛI			16 19					1
1	856.8			27	148	(-)	18	10	15		0.0			
-			<i>/////E</i>			\setminus / \mid		S	16					
	—855.8 —			28		ΛI			22					
	854.8	Sand lenses at 29 and 29.5 feet.		29	149	(-)	18	5.9	Q,		0.0	-		
	E		/////E			\backslash / \mid		0.0	13		0.0			
	853.8			30		ΛI			20 28					
	852.8	Boring terminated at 31 feet and tremmie		31		\angle						-		
Ì		grouted with cement-bentonite grout.]]									}		
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project														
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SI EPA														
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	MC ENVIRONMENTAL RISK MA	NAGEMENT	г і	-1 0 10	ים ג	OFIF	ıg ı	.og		Page1 of2_
	3709.001			g No.		G-8	<u>3-98</u>		_ M o	nitor Well No.
roject Nan	ne Enviro-Chem Superfund Site		Site I	Locati	on _			JS 4	<u>21, Z</u>	ionsville, Indiana
urface Ele	vation 884.6 Completion Depth	24.0 ft bgs	Auge	r Dep	th	22	ft b	gs	Rot	ary Depth <u>ft bgs</u>
uadrangle	Rosston Sec. T.	_ R	Date	: Stan	t	1/3	0/98	3	_ Fini	sh2/5/98
TM (or St	ate rd. N.(X) <u>921598.6</u> E.(Y) <u>725</u>		Wate	r Lev	el:					
	39° 57' Longitude 86° 1									
	ation Southern Concrete Pad Excavation Are		<u> </u>	S	AM Si	PLI	<u> </u>			PERSONNEL
	_	<u>a</u>			Sample Recovery (inches)	:		_		Geologist - Steve Conwa Driller - Dave Ellis
rilling Equ	ipment and Method <u>CME-75</u>) c	Sample No.	Sample Type	ery (i	=	N Value (blows/6")	ر ار %	PID Reading (ppm)	Helper - Justin
= = 7		Graphic Log Depth	du	ampl	ampl ecov	p (ts	Valu	loist	0 E	Helper -
Elevation	DESCRIPTION OF MATERIALS LEAN CLAY FILL with Sand soft to medium	7////	73		ισ œ	.4	z =	2 0		REMARKS
	stiff, brown, trace roots and gravel (CL-FILL)		/ •	$\backslash / $		В	1		0.0	
-883.6		1		X			2			
-882.6		//// * •		$V \setminus$				L		
-002.0		2 2	74	$\sqrt{7}$	9	.33 B	1	20	0.9	
-881.6		//// = 3		ΙX		,	1		1	
	Gravel lens at 3.6 feet			/			2			
-880.6	CLAYEY SAND FILL very stiff, brown	4	75	$\langle - \rangle$	16	3.1	2	12	3.0	
	(SC-FILL)			$ \setminus $		В	7			
-879.6		5		$ \Lambda $		ı	7			
-878.6	TEAN OF AV. 11. 2	### 6		$\langle L \rangle$			<u> </u>	<u> </u>	<u>-</u> -	
	LEAN CLAY with Sand hard, brown and gray mottled, trace gravel (CL)		210	$\Lambda /$	21	4.5 P	6	13	17.7	
877.6	<u> </u>	7		 X			9			12" Steel Casing installed
İ				$ / \setminus$			12			to 7 feet.
-876.6	UW = 144.3 pcf SG = 2.766	8 × 8	211		24	3.0	ST	13	NA	
- - -875.6		9	.							
-875.6	Grades with Gravel.	#	' <u> </u>	H					}	
-874.6		# 10	212		21	3.0	5	11	4.5	
:			212	\mathbb{N}	-	P	5	' '	7.3	Bottom of Excavation at
873.6		1	1	X			7		İ	873.8+/-
			_	$V \setminus$						
-872.6 -	Gravel lens at 12.4 feet	11	213	1	21	3.0 P	3	11	3.5	
- - -871.6	5.2.37.00.0 at 72.77.00t	1:	3	1			5 6			
-				$ /\rangle$			7			
- 870.6 -	LEAN CLAY stiff to very stiff, gray, trace	1	4 214	(20	2.0	3	9	1.5	
-	sand and gravel (CL)		_	$ \setminus $	}	Р	4 5			
-869.6 -		1	5	I			9			
- - -868.6		1	6	L	_		<u></u>	<u> </u>	L_	
			215	1	21	1.75 P	3 4	11	1.5	
- 867.6		1	7	X			4 5			
-				//	J		"			
866.6		1	216		21	1.5	1	11	1.5	1
- - 865.6		1	۵	V		P	3			
605.6		W/F '	3				6			
_		<i>\\\\\\</i>	1	V \	J		1		Ī	1

	Ve	Sale MC ENVIRONMENTAL RISK MANAGEMENT	Г	Field	Bo	orin	g L	.og		Page2_ of2_
		3709.001 County <u>Boone</u>		ng No.		G-8	-98		_ Mo	nitor Well No.
ı		ne Enviro-Chem Superfund Site								
	Surface Ele	evation 884.6 Completion Depth 24.0 ft bgs	Aug	er Dept	:h	22	ft bo	as_	Rot	ary Depth <u>ft bgs</u>
	Quadrangle	<u>Rosston</u> Sec T R	Date	e: Start		1/3	0/98	3	_ Fini	sh2/5/98
ļ	UTM (or St Plane) Cool	ate rd. N.(X) <u>921598.6</u> E.(Y) <u>725895.7</u>	Wat Dur	er Leve ing Drilli	il: ing <u>¥</u>	21.0) ft l	ogs	_ At	Completion <u> 1.0 ft bgs</u>
l	Latitude	39° 57' Longitude 86° 16' "		SA	MA	PLF	S			PERSONNEL
l		ation Southern Concrete Pad Excavation Area	-	ΤŤ	<u>§</u>					Geologist - Steve Conway
	Drilling Equ	ipment and Method CME-75	و ا	Sample Type	(incl			€	guil	Driller - Dave Ellis Helper - Justin
١		DESCRIPTION OF MATERIALS	Sample No.	aldu	e oc	(ts)	/alue	isture	PID Reading (ppm)	Helper -
	Elevation							≗ੈਂ 11		REMARKS
	E	LEAN CLAY stiff to very stiff, gray, trace sand and gravel (CL)	21	Λ	22	P P	3	''	1.5	
	863.6	₹21		X	1		12 12			
Ì	862.6		2 21	V					0.5	
	E	POORLY GRADED SAND medium grained, dense, gray (SP)	218	I	18	NP	6 12	9	0.5	
ļ	861.6	23	3	X	ļ		19	ļ		
l	860.6	24	. L	I						
		Boring terminated at 24 feet and tremmie grouted with cement-bentonite grout.	1							
			}	1						
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We	HC ENVIRONMENTAL RISK MA	NAGEMEN'	Т	Field	d B	orir	ıg L	.og		Page1 of2_
	3709.001			ng No.		G-	9-98		_ M o	onitor Well No.
Project Nan	ne Enviro-Chem Superfund Site		Site	Locat	ion		U	S 4:	21, Z	ionsville, Indiana
Surface Ele	vation 884.4 Completion Depth	36.0 ft bgs	Aug	er Dep	th	34	ft b	gs	_ Ro	tary Depth <u>ft bgs</u>
Quadrangle		R.	Date	e: Star	t	1/2	2/98	3	Fin	ish1/26/98
UTM (or St	ate rd. N.(X) 921739.4 E.(Y) 7258		Wat	er Lev	el:					Completion <u>▼ ft bgs</u>
									_ ```	
	39° 57' Longitude 86° 1		-	<u>S</u>			ES			PERSONNEL
Boring Loca	Southern Concrete Pad Excavation Area)			Sample Recovery (inches)					Geologist - C. O'Neil Driller - Dave Ellis
Drilling Equ	ipment and Method <u>CME-75</u>	<u> </u>	Sample No.	Sample Type	ر ر	_	N Value (blows/6")	6 (% (%	PID Reading (ppm)	Helper - Justin
		Graphic Log Depth	a du	aldm	mple	ts)	Valu	oistu	D Re	Helper -
Elevation	DESCRIPTION OF MATERIALS 13" Concrete slab over 12" Crushed		7	Š	ॐ æ	Ō NA		žŏ	₹ 0	REMARKS
F	limestone subbase floor	444	ĺ	\mathbb{N}	•	144	-			
883.4		4 4 E		ΙX			7 12		343	
882.4		44E 2		/						
= °°°2.4	LEAN CLAY very stiff to hard, gray (CL)		8	1	15	4.5 P	6 7	11	284	
881.4	UW = 146 pcf	//// E 3		1			8			
				$ \rangle \rangle$			9			
880.4		4	9	\mathbf{t}	15		2	11	280	·
879.4	Sand lens at 4.5 feet			\mathbb{I}		P	6 5			
E 873.4	Grades with CLAYEY SILT		'				6			
878.4		₩ E 6	27	(17	4.1	4	11		
l E 🔝			'	$\backslash /$	''	В	6	' '		12" Steel Casing installed
877.4		7	'	X			8			to 7 feet.
876.4		<i>∭</i> _₹ 8	, L	V						
[-	POORLY GRADED SAND medium grained, loose, gray, saturated (SP)	E.	28	Λ	17	2.5 P	2	12		
875.4	LEAN CLAY to SANDY LEAN CLAY gray,	97777		X		NP	4			Bottom off Excavation at
l E	trace gravel (CL)		-	//			4			875.6 + /-
874.4	POORLY GRADED SAND medium grained,	##E 1	0 29		19	NP	3	11		
 	loose, gray, saturated (SP)		1	V		2.0 B	3			
	LEAN CLAY to SANDY LEAN CLAY gray, trace gravel (CL)			$ \wedge $			5			
872.4	UW = 148 pcf	1	2 30	()	18	1.4	2	11	-	
E		/// .		$ \bigvee$		В	4			
871.4		1	3	$ \Lambda $			6			
870.4		/// _1	4 31	<u> </u>	22	1.2	1	1.		_
I E			31	Λ	22	1.3 B	4	11		
869.4	11144 - 1.42 mas	1	5	IX			6			
868.4	UW = 143 pcf	////	_	V	\downarrow					
E		/////F '	6 32	1	16	2.2 B	3	11		
867.4		//// ** 1	7	1			7			
E				$ /\rangle$			9	}		
866.4	SAND lens at 18 feet	1	8 33		13	3.25	8	9	<u> </u>	-
865.4		//// * .	9	V		P	11			
	UW = 140 pcf	//// *	3				10			
									<u> </u>	

	3709.001											
	ne Enviro-Chem											
	vation884.4	_			_							
uadrangle FM (or St	Rosston Sec	т	. R		Date: Wate	Start		1/2	2/98	3	_ Fin	ish <u>1/26/98</u>
ane) Coo	rd. N.(X) 921739.4	E.(Y)	76.6		Durin	g Drill	ling <u>V</u>	28.0	ft b	gs	_ At	Completion <u> ft</u>
titude	39° 57' " Long	itude <u>86°</u> <u>16</u>	<u>3 '</u>			<u>-</u>	ΔΜ	PI I	FS			PERSON
	ation Southern Concrete Pa						(Se					Geologist - C. O'Nei
illing Equ	ipment and Method <u>CME-75</u>				<u>ن</u>	λbe	ij		۔ ا	ŝ	g.	Driller - Dave Elli
	· · · · · · · · · · · · · · · · · · ·		Graphic Log	Depth (feet bgs)	Sample No.	Sample Type	yery	tsf)	alue ws/6	sture tent (PID Reading (ppm)	Helper - Justin Helper -
levation	DESCRIPTION OF N	MATERIALS	Log G	e Ce	Sam	Sam	Sample Recovery (inches)	Qp (tsf)	N Value (blows/6")	Mois Con	6 g	REMARI
					34	abla 1	14	NP	4			
-863.4	POORLY GRADED SAND me grained, loose to medium de		E	- 21		VΙ			4			
l	gravel (SP)	, 5.2,,	E			$/\backslash$			7			
862.4			E	- 22	35	(-)	12	NP	4			-
			E			$ \setminus $			8			
861.4			E	- 23 :		$ \Lambda $			10			
860.4			E	- 24	36	\square	14	AID.				Grain Sina Arabada
	Cc = 0.49 Cu = 7.8		E		30	$\setminus A$	14	NP	6 8			Grain Size Analysis
859.4	24 - 110			- 25		X		}	10			
055			E E			$V\setminus$						
-858.4		i		- 26 :	37	\Box	13	NP	6			1
-857.4			E	- 27		V			10		t 	
		ļ	E	-		$ / \setminus $			11		 	
-856.4			F	28	38	(-)	13	NP	4		-	1
-855.4			E	: - 29		$ \bigvee $			10			
-855.4			F	- 29 -		$ \Lambda $			10			
-854.4			F	- 30 -	39	$\langle - \rangle$	14	NP	8	_		1
			F		29	\ /	'*	INF	12	 		
-853.4			F	- 31		X			12			
-852.4			E	: - 32		/				<u> </u>		
JJE.4			E	- "	40	ΝΖ	17	NP	3			
-851.4			E	_ - 33		X			18			<u>, </u>
			E	•		$V \setminus$			21	ļ		
-850.4			E	- 34 -	41		19	NP	7	18	<u> </u>	1
-849.4	SILT medium dense, gray, t	race gravel (SM)		- - 35		Ι \			11			
						$ / \rangle$			14			
848.4	Boring terminated at 36 fee	t and tremmie		36	-	<u> </u>	_	-	-	-	\vdash	†
l	grouted with cement-benton						 					
					1	1	1	i	1	i	1	1

VC	INC. ENVIRONMENTAL RISK MA	NAGEM	IENT		-ieid	ים ג) TII	ıg ı	.og		Page1 of2
Project No.	3709.001 County Boo	ne		Borin	g No.		G-1	0-98	3	_ Mo	nitor Well No.
Project Nam	ne Enviro-Chem Superfund Site			Site L	.ocati	ion _		L	IS 4:	<u>21, Z</u>	ionsville, Indiana
Surface Ele	vation 883.8 Completion Depth	32.5 ft	<u>bgs</u>	Auge	r Dep	th	31	ft b	gs	_ Rot	tary Depth <u>Justin ft bgs</u>
Quadrangle	Rosston Sec. T.	_ R		Date:	Star	t	1/2	8/98	3	_ Fin	ish <u>2/3/98</u>
UTM (or Sta Plane) Coor	ate rd. N.(X) 921668.0 E.(Y) 725	875.2		Wate Durin			16.	0 ft	bgs	_ At	Completion <u>▼ 0.1 ft bgs</u>
Latitude	39° 57' * Longitude 86° 1	<u>6 '</u>			<u> </u>	ΑM	PI I	FS			PERSONNEL
Boring Loca	ation Southern Concrete Pad Excavation Are	a								<u> </u>	Geologist - Steve Conway
Drilling Equi	ipment and Method CME-75			ا ہ	Ape	(inches)		ا	€	<u>6</u>	,
	-	piłą	oth t bgs	Sample No.	Sample Type	Sample Recovery ((tst)	alue ws/6'	sture tent	PID Reading (ppm)	Helper - Helper -
Elevation	DESCRIPTION OF MATERIALS	Graphic Log	(feet bgs)	Sam	Sam	Sam	å	z g	Moisture Content (%)	5 g	REMARKS
F	13" CONCRETE over limestone subbase.	44	-								
882.8		14.4	_ 1	61		6	ΝP	<u> </u>	13	121	
E		44	_		\setminus /			-			
881.8		00	_ 2		X			11			
880.8		44	_ _ 3								
E 500.0	CLAYEY SAND FILL brown, trace brick and gravel (SC)		_	62	N /	15	1.0 B	5 4	17	139	į
879.8	•		<u>-</u> 4		X			3			
E			=		$/\setminus$			3			
878.8	LEAN CLAY medium stiff, brown, black and		- 5 -	63	7	22	.7	1	21	63	1
877.8	gray (CL) Grades to brown.		- - 6		V		В	3 2			
	diades to blown.		=		$ /\rangle$			2			
876.8			<u> </u>	125	$\langle - \rangle$	20	5.8	5	12	34	12" Steel Casing installed
F			-		$ \bigvee$		8	8	Ì		to 7 feet.
875.8			- 8 -		$ \Lambda $			10			
874.8	SANDÝ ČLAÝ dark brown (CL)		_ _ 9	126	/	16	.85	ST	9	NA	Bottom of Excavation at
E	UW=133.1 pcf SG=2.75		_								874.8 + /-
873.8			<u> </u>								
872.8			- - 11						_		1
F	SAND medium to coarse grained, medium		= ``	127	Λ	12	NP	3 6	10	6.0	
871.8	dense, trace clay (SP) LEAN CLAY with Sand very stiff, gray (CL)		_ 12	2	X			7			
E			=	,	$V\setminus$						
			13 	128	1	13	3.3 B	4 5	11	2.0	
869.8			<u>-</u> - 14	·	Ι χ]	6			
E			=		$ / \setminus$			6			
868.8			18 	129		17	3.0	2	10	5.0	1
867.8			_ ¥16	3	$ \bigvee$		В	5	1		
E			= ``		$ /\rangle$			6			
866.8	POORLY GRADED SAND medium to coarse		17	130		4	NP	-	-	0	1
E 005 0	grained, gray (SP)		Ξ ,,		V			2			
865.8			18 	'	$ \Lambda $			2			
864.8			<u>-</u> 19	131	(15	NP	2	 -	0	-
E			Ē	31	ΙX		141	5			
	VERSAR, INC.; 200 W. 22nd Stree		250	1	<u> </u>	11 01	1140		0/20	9.05	

template ID:ILEPA\gint project ID:\Versar project no:\\run date:3/6/98 Quadrangle Ross
UTM (or State
Plane) Coord. N.(X) Drilling Equipment and Method CME-75 **Boring Location** Surface Elevation Project Name Project No. Elevation -859.8 -860.8 -851.8 -853.8 -855.8 -856.8 -857.8 -858.8 -861.8 862.8 -852.8 854.8 39° DESCRIPTION OF MATERIAL grouted with cement-bentonite grout. SILTY SAND to FINE SAND medium dense, gray (SM/SP) Boring terminated at 32.5 feet and tremmie grained, gray (SP) POORLY GRADED SAND medium to coarse Rosston Southern Concrete Pad Excavation Area 3709.001 MC ENVIRONMENTAL RISK MANAGEMENT 883.8 921668 VERSAR, INC.; 200 W. Enviro-Chem Superfund Site Longitude County Completion 22nd Street; 960 Depth 32.5 വ 25875 16: Suite Graphic Log ft bgs 250; Depth 32 30 29 28 26 25 24 23 22 (feet bgs) Lombard, Water Level: During Drilling 132 Auger Depth Boring No. Date: Start Site Location 135 134 Sample No. Field Boring Log Sample Type ഗ = AMPLE Sample 16 60148; Recovery (inches ⊈16.0 ft bgs 목 G-10-98 Qp (tsf) 1/28/98 31 ft bgs N Value 20 13 13 13 19 630/268-8555 9 7 8 5 9 7 8 6 **രോഗ** ഗ ഗ (blows/6") US 421, Zionsville, Indiana Moisture Content (%) PID Reading 0 0 0 0 o ۶ Rotary Depth Monitor Well No. (ppm) Completion Sampler Page Helper Helper -Driller -Geologist -PERSONNEL REMARKS 2/3/98 N H Justin Dave Ellis Steve Conway 0.1 으 ft bgs ft bgs 1

INC. ENVIRONMENTAL RISK MA	NAGEMEN	Τ '	rieid	I D	Orii	ıg L	.og		Page1_ of2
			ıg No.		G-1	1-98	3	_ Mo	nitor Well No.
e Enviro-Chem Superfund Site		Site	Locati	ion .			JS 4:	21, Z	ionsville, Indiana
vation 884.6 Completion Depth	36.0 ft bgs	Auge	r Dep	th	34	ft b	gs	_ Rot	tary Depth <u>ft bgs</u>
	_ R	Date Wate	: Star	t	1/2	2/98	3	_ Fin	ish <u>1/27/98</u>
d. N.(X) 921739.6 E.(Y) 725		Durir	ıg Dril	ling <u>T</u>	<u> 220.</u>	0 ft	bgs	_ At	Completion <u>Y</u> ft bg
			<u>S</u>			ES			PERSONNE
ition Southern Concrete Pad Excavation Are	a	-		ches)					Geologist - Steve Conw
ipment and Method <u>CME-75</u>	ع غز	No.	le Type	le 'ery (in	ë	ue s/6"}	ure nt (%)	Bading	Driller - Dave Ellis Helper - Justin
DESCRIPTION OF MATERIALS	Grap Log Dept	Samp	Samp	Samp Recov	Op (ts	N Val	Moist	PID R (ppm)	REMARKS
10" Concrete floor slab over 14" Crushed	4.4.	4	17			-			
limestone subbase	444		V			4			
			$ /\rangle$			11			
LEAN CLAY FILL with Sand very stiff,		5	$\langle - \rangle$	10	3.5	4	12	31.9	
brown and gray mottled (CL-FILL)		,	V		Р	5			
	WE	'	$ \Lambda $			9			
LEAN CLAY stiff to very stiff, gray, trace		F 6	$\langle - \rangle$	17	2.0	3	10	24.5	
sand and gravel (CL)			\mathbb{N}		Р	4			
	/// //////	5	X			6]		
	WE.	<u>, L</u>	$V \setminus$						
		42	N/	13	1.7 B	3	11	74.8	
	· - ·	7	X			2			Steel Casing installed to feet.
			$V \setminus$			5			
		43	1	23	l .		11	5.0	Bottom of Excavation at 876.6 + /-
		a	ΙV		В	7			
						2			
IIW = 145 1 pef SC : 2.70	1	0 44		17	2.8	ST	12	NA	
OW = 145.1 pct SG = 2.70					В				
	/////	1							}
	# 1	2		-	1			24	
		45	$\mathbb{N}/$	24	1.3 P	3	' '	3.4	
	1	3	X			5			
	/// .		$\backslash \backslash$			ľ			
	<i>##</i>	4 46	1/	24	1.9	1	11	3.4	
	///E_1	5	 \ \			5			
			$ /\rangle$			6			
	1	6 47		23	1.5	2	11	2.9	
	<i>₩</i> .	7	1		В	3			
Sand lens at 17.5 feet		′				4			
	### <u></u> 1	8 48	+	20	14	1	13	2 9	-
stiff, gray (CL)		73	\mathbb{N}		В	2			
····, g, ,,	<i>/////</i>	- 1	1 \	1					
, g ,	///	9	X	İ		5			
	Boyland County Boyland Site Enviro-Chem Superfund Site Enviro-Chem Superfund Site Environ 884.6 Completion Depth Rosston Sec. T. Sec. T. Sec. T. Sec. T. Sec. T. Sec. T. Sec. T. Sec. T. Sec. Sec. T. Sec. T. Sec. T. Sec. Sec. T. Sec. Sec. Sec. Sec. Sec. Sec. Sec. Sec	TEAN CLAY Stiff to very stiff, brown and gravel (CL) Sand lens at 17.5 feet Teans Sec	### Sand lens at 17.5 feet ### Enviro-Chem Superfund Site ### Enviro-Chem Superfund Site Site Site Site Site Site	Borney Boone Enviro-Chem Superfund Site Site Location 884.6 Completion Depth 36.0 ft bgs Auger Dep Rosston Sec. T. R. Date: Star Water Lev ate d. N.(X) 921739.6 E.(Y) 725846.6 39° 57' Longitude 86° 16' Station Southern Concrete Pad Excavation Area Ignment and Method CME-75 DESCRIPTION OF MATERIALS 10° Concrete floor slab over 14° Crushed limestone subbase LEAN CLAY FILL with Sand very stiff, brown and gray mottled (CL-FILL) LEAN CLAY stiff to very stiff, gray, trace sand and gravel (CL) UW=145.1 pcf SG=2.70 Sand lens at 17.5 feet LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY Sand lens at 17.5 feet LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY LEAN CLAY with Sand to SANDY CLAY	Boring No. The Enviro-Chem Superfund Site Site Location 884.6 Completion Depth 36.0 ft bgs Rosston SecTR	3709.001 County Boone Boring No. G-1	Sand lens at 17.5 feet Sand lens at 17.5 f	Sample Southern County Southern Site Location US 4:	Sample Boone Boring No. G-11-98 More Enviro-Chem Superfund Site Site Location US 421, Z Vation 884.6 Completion Depth 36.0 ft bgs Rosston Sec. T. R. Part Rosston Sec. T. R. Part Rosston Sec. T. R. Part Rosston T. R. Part Rosston T. R. Part Rosston T. R. Part Rosston T. R. Part Rosston T. R. Part Rosston T. R. Part Rosston T. Rossto

VC	INC. ENVIRONMENTAL RISK MA	NAGEN	JENT		1610	3 80	orın	ıg r	.og		Page2_ of2_
	3709.001 CountyBoo				g No.		G-1	1-98	3	_ M o	nitor Well No.
Project Nan	ne Enviro-Chem Superfund Site			Site L	.ocati	on .		Ļ	S 4:	21, Z	ionsville, Indiana
Surface Ele	vation 884.6 Completion Depth	36.0 ft	bgs	Auge	r Dep	th	34	ft b	gs	_ Rot	tary Depth <u>ft bgs</u>
	Rosston Sec. T.	_ R					1/2	2/98	3	_ Fini	ish <u>1/27/98</u>
UTM (or St Plane) Cool	ate rd. N.(X) <u>921739.6</u> E.(Y) <u>7258</u>	346.6		Wate Durin	r Leve g Drill	el: ling <u>\$</u>	720 .	0 ft	bgs	_ At	Completion <u>Y</u> ft bgs
Latitude	39° 57' Longitude 86° 1	<u>6 '</u>			S	AM	PLI	-S			PERSONNEL
Boring Loca	ation Southern Concrete Pad Excavation Area	1				hes)					Geologist - Steve Conway
Drilling Equ	ipment and Method <u>CME-75</u>	Co T		. و	Sample Type	Sample Recovery (inches)		•	- 8	guit	Driller - Dave Ellis Helper - Justin
		Graphic Log	(feet bgs)	Sample No.	aldr •	nple cover	Op (tsf)	N Value (blows/6")	isture Itent	PID Reading (ppm)	Helper -
Elevation	DESCRIPTION OF MATERIALS	ا و ق	å å		Sar				8 5		REMARKS
	POORLY GRADED SAND medium to coarse grained, medium dense, gray, trace gravel		<u>-</u>	49	\	5	NP	1/ 18"	-	3.9	
863.6	(SP)		_ 21		X						
E			Ξ		/						
862.6			<u> </u>	50		12	NP	3 6	•	6.0	
861.6			_ — 23		ΧI			6	i)		
lE I			=		$/\backslash$			8			
E860.6			24 	51		15	NP	3	-	8.2	ļ
859.6			_ 25		V			5 7			
E			_ _ _	'	$ \Lambda $			7			
858.6	Cc=9.0		_ 26	52	$\left\langle -\right\rangle$	13	NP	4		10.3	Grain Size Analysis
E	Cu = 8.0		-		$ \setminus / $			8			
857.6			27 	'	X			14			
856.6			_ 28					_			
				53	Λ	15	NP	10	-	2.9	
855.6			29 		X			15 20			
854.6			_ 30		$V \setminus$		 			 	j
E ****			_ 3C	54	\setminus	14	NP	8	-	2.9	
853.6			<u> </u>		X			16			
					$/\setminus$			18			
852.6	Grades to dense		<u> </u>	55		18	NP	7	-	1.8	1
851.6			= - 33	3	I V			13			
F			E		//			36			
850.6			F 34	56		14	NP	6	-	3.4	-
849.6			_ _ 35		V	1		14			
- 543.6								24			
848.6	Boring terminated at 36 feet and tremmie		E 36	3├	<u> </u>	-	-		-	-	-
	grouted cement-bentonite grout.		 								

	MC ENVIRONMENTAL RISK MA	NAGEMENT	. '	-ieic	J D	וווע	ıy L	.og		Page1 _ of2
	3709,001 County Boo			g No.		G-1	2-98	3	_ M o	nitor Well No.
Project Nan	ne Enviro-Chem Superfund Site		Site I	Locati	on .		U	IS 4:	21, Z	ionsville, Indiana
Surface Ele	vation 884.0 Completion Depth	36.0 ft bgs	Auge	r Dep	th	34	ft b	gs	_ Rot	ary Depth <u>ft bgs</u>
Quadrangle	Rosston Sec T	_ R	Date	: Stan	·	1/2	8/98	3	_ Fini	ish <u>2/1/98</u>
UTM (or St Plane) Coor	ate rd. N.(X) <u>921671.0</u> E.(Y) <u>725</u> 8	342.4		r Levi ig Dril		220.	0 ft	bgs	_ At	Completion <u>T</u> ft bgs
Latitude	39° 57' Longitude 86° 1	<u>6 ·</u>		_	<u> </u>	DI I	<u> </u>			PERSONNEL
	ation Southern Concrete Pad Excavation Area			3,	8	<u> </u>			<u> </u>	Geologist - C. O'Neil
	ipment and Method <u>CME-75</u>	Graphic Log Depth (feet bgs)	<u>.</u>	Sample Type	Sample Recovery (inches)	(tsf)	alue ws/6")	sture tent (%)	PID Reading (ppm)	
Elevation	DESCRIPTION OF MATERIALS	1 1		Sarr				S S	5 9 9	L
E	7" CONCRETE over limestone FILL subbase.	4.4	57	$\backslash /$	15	5.0 P	8 27	13	4000	
883.0		1 2 2 1		ΙXΙ			18	ļ		
Ξ	····	17.7.		$/\setminus$						
882.0 	LEAN CLAY FILL with Sand stiff to very stiff, brown and gray, trace gravel and brick		58	17	20	3.7 B	6 5	10	912	
881.0	fragments (CL-FILL)	3		X			6			
				$/\backslash$			6			
880.0		4	59	(0	-	-	-	-	
_ 879.0		5		V						
E				$ /\rangle$						
878.0	LEAN CLAY stiff to very stiff, gray, trace	6	60	$\langle \cdot \rangle$	24	1.2		9	0.8	
E 877.0	sand and gravel (CL)	/// 7		IV		В	5			
E ","."	·			$ \Lambda $			7			12" Steel Casing installed to 7 feet.
876.0		8	82	$\langle \cdot \rangle$	17	3.0	1	10	1.1	
875.0		9		IV		В	3			
8/5.0		*************************************		Μ			5			Bottom of Excavation at 875.1 +/-
874.0		10	83		18	2.6	4	11	0.5	
E				\mathbb{N}		В	5			
873.0 		#F 11	'	$ \Lambda $			9			
872.0		12	84		18	1.7	2	11	0	
				$\backslash /$.	В	4	``		
871.0 -		13	3	X			10			
870.0	CILTY CAND to fine CAND and it and design	14	85	<u> </u>	14	NP	-	13	0	
E !	SILTY SAND to fine SAND medium dense, gray (SM/SP)			\mathbb{N}	14	NP	8	'3		
869.0		F 19	5	X			10			
868.0	LEAN CLAY	11	5 C	\bigvee	1.	2.	<u> </u>	10	<u> </u>	-
E	LEAN CLAY with Sand very stiff, gray (CL)		86	1	18	3.1 B	6	10	0	
867.0		17	7	X			6			
866.0		11	a	V			<u></u>			
- 800.0		WE"	87	1	17	3.3 B	2	10	0	}
865.0		11	9	X			4			
E				$V \setminus$						
	VERSAR, INC.; 200 W. 22nd Stree	t: Suite 250:	Lomi	hard	IL AC	149	: 63	0/26	8-85	55

roject Nan	ne Enviro-Chem Superfund Site		Site	Loca	tion		U	S 4:	21, Z	ionsville, Indiana
urface Ele	evation 884.0 Completion Depth	36.0 ft bg	s Aug	er De	pth	34	ft b	gs	_ Rot	tary Depth ft bgs
uadrangle	Rosston Sec. T.	R.	Date	e: Sta	rt	1/2	8/98	3	Fini	ish 2/1/98
TM (or St	ate rd. N.(X) 921671.0 E.(Y) 725		Wat	ter Le	vel:					
					y <u>-</u>	-20.	<u> </u>	<u> </u>		Completion <u>T It by</u>
	39° 57' Longitude 86°		-	S	MA	PLI	ES			PERSONNE
oring Loca	ation Southern Concrete Pad Excavation Are	a	-		Sample Recovery (inches)					Geologist - C. O'Neil
rilling Equ	ipment and Method <u>CME-75</u>	ပ	(s) &	1 Ap	ح ج		(_9	%	grib	Driller - Dave Ellis Helper - Justin
		Graphic Log Depth	(feet bgs)	Sample Type	mple cover	Op (tsf)	N Value (blows/6")	Moisture Content (%)	PID Reading (ppm)	Helper -
Elevation	DESCRIPTION OF MATERIALS	Graphic Log (Depth	!				_			REMARKS
	SAND medium to coarse grained, loose to medium dense, gray (SP)	E	88		18	NP	1 2	17	0	
863.0	across Stat for t	E:	21	Ι Χ			5			
.		F		/\			4			
862.0			89	+	12	1.2	2	14	0	
861.0	LEAN CLAY stiff, gray, trace sand (CL)		23	V		В	2			
- 60 1.0 -			.5				5			
- 860.0			24 90	. (13	0.8	1		0	
-			"	$\backslash \backslash \backslash$	/ '	В	2			
859.0			25	ΙX	1		3			
=	SAND medium to coarse grained, loose to			V	V					
-858.0	medium dense, gray (SP)	E S	26 91	\	12	NP	4		0	
- -857.0		E	27	$ \rangle$			9			
-		E		/\			9			
- - 856.0			28 92	2	20	NP	2		0	+
				$ \cdot $	'		8			Į.
855.0 -		E	29	$ \Lambda$			14			
- 854.0		(A)E	30	_	<u>\</u>	1.5	_			-
-		E	93	' N /	21	NP	12		0	l
- - 853.0			31	X			14 19			
-		E		V	\bigvee		'			
852.0		E	32 94	1	15	NP	4		0	
- 851.0		E	33	1	' ·		9		Ì	
<u>-</u>				/\	\backslash		16			
- 850.0			34 9	5 (13	NP	7	_	0	-
-				$ \cdot $	/		9			
84 9.0		F	35				15			
- - 848.0	Being Asserting 1 200 f		36	\bot	¥_		_		-	1
	Boring terminated at 36 feet and tremmie grouted with cement-bentonite grout.									
								}		
								}		
							1			

Project No.	3709.001 County B	oone		Boring	No.		G-1	3- <u>98</u>	3	_ Mo	nitor Well No),
	e Enviro-Chem Superfund Site											
	vation 886.5 Completion Dept											
	Rosston Sec. T.											
JTM (or Sta				Wate	r Leve	el:						
										- ^` 		
	39° 57' * Longitude 86°			<u> </u>	S	AM	PLI	ES			PER	SONNE
Boring Loca	ation Southern Concrete Pad Excavation Ar	ea				Sample Recovery (inches)					Geologist - Driller -	Steve Conw Dave Ellis
Orilling Equi	ipment and Method <u>CME-75</u>	- [2	c (ŝ	Sample No.	Sample Type	ız (ir	_	(8,	Moisture Content (%)	PID Reading (ppm)	Helper -	Justin
		Graphic Log	Depth (feet bgs)	ample	aldwa	ample	p (tsf	N Vatue (blows/6")	oistu	D Re	Helper -	
Elevation	DESCRIPTION OF MATERIALS LEAN CLAY FILL with Sand hard, brown	0 3	<u>Ω Ξ</u>	222	Š	3 E	₫ 4.5+	z ≘ 5	Σ ඊ	1.9		MARKS
_	and gray (CL-FILL)		_	222	\setminus / \mid		P	3				
885.5			- 1	ļi	X			2 5				
- 884.5			_ 2		\triangle							
- 884.5			- 2	223	\setminus /	19	4.5 P	9	10	4.6		
883.5			<u> </u>		X			7 9		ļ		
=			<u>-</u>		$/\setminus$			9				
—882.5 _	LEAN CLAY with Sand, very stiff, gray (CL)		- 4	224	\Box	19	3.5	1 1	10	0.0		
			_ _ 5		$ \bigvee $			5 5				
= 1					/			9				
880.5			_ 6	293	$(\!-\!)$	19	2.5	6	11	0.0		
=			= _		$ \bigvee $		В	6 7			}	
—879.5 —			_ 7 _		$ \Lambda $			10			12" Steel C	asing installe
 878.5			_ _ 8	294	$\langle - \rangle$	18	2.1	3	12	0.0		
=			=	234	\backslash	10	B	3	'-	0.0		
877.5			_ 9	Î	X			8				
876.5			_ 10		<u> </u>							
= 370.3			= '0	295	N /	20	1.7 B	3	12	0.0		
875.5			<u> </u>		X			5 6				
			=		$V \setminus$							
874.5 			— 12 -	296	/	22	1.7	3	12	0.0	1	
873.5			_ _ 13	3	V		В	4	ļ			
Ē			Ξ		$ / \setminus$			6				
872.5			_ _ 14	297	$\left\langle \cdot \right\rangle$	24	1.2	1	12	0.0		
871.5			_ _ 15		V		В	2 4				
-3/1.5	Sand lenses at 15.3 and 15.9 feet.		_ 13		$ \Lambda $			4				
870.5			_ 16	3 298	()	22	0.9	2	11	0.0	-	
			_		$ \setminus /$		В	3				
869.5 			— 17 =	7	X			6				
- - - - 868.5			_ 18	3	\backslash	با	1	<u> </u>	1.0	1.5		
F			_ Ţ	299	1	18	NP	10	18	19		
867.5	POORLY GRADED SAND medium to coarse grained, medium dense, gray, trace gravel,		19	9	X			9				
<u> </u>	saturated (SP)		-	1	17 \	1	1	1 13	1	1	ì	

WE	No. environmental risk ma	NAGEMEN	JT	r	·ieic	1 B	orın	g L	.og		Page	2 of2
1	o3709.001 County Boo			Boring	No.		G-1	3- <u>9</u> 8	3	_ Mo	nitor Well N	o
Project Na	me Enviro-Chem Superfund Site		_	Site L	ocati	on _		U	S 42	21, Z	ionsville, l	ndiana
Surface E	levation 886.5 Completion Depth	24.0 ft bg:	<u>s</u> /	Auger	Dep	th	22	ft b	gs	_ Rot	ary Depth_	ft bgs
Quadrang	le Rosston Sec. T.	_ R	_ [Date:	Start		2/1	0/98	3	_ Fini	sh <u>2/1</u>	2/98
UTM (or S Plane) Co	State ord. N.(X) <u>921820.5</u> E.(Y) <u>725</u>	864.1	_ '		r Leve g Drill		218.0	6 ft	bg <u>s</u>	_ At	Completion	▼ ft bgs
Latitude_	39° 57' "Longitude 86° 1	<u>6 ·</u>	<u>-</u> [S	ΔM	PLE	S			PFF	RSONNE
i	cation Southern Concrete Pad Excavation Area		L			188)						Steve Conwa
Drilling Ed	uipment and Method <u>CME-75</u>		\dashv	ا فِ	ype Y	Sample Recovery (inches)			8	Bui	Driller - Helper -	Dave Ellis Justin
<u> </u>		Graphic Log Depth	t bgs	Sample No.	Sample Type	over ple	Op (tsf)	alue ws/6	Moisture Content (%)	PID Reading (ppm)	Helper -	JU31111
Elevation	DESCRIPTION OF MATERIALS				San						RE	MARKS
E	POORLY GRADED SAND medium to coarse	E		300	$\backslash / \!\! /$	8	NP	0	21	11		-
865.5	grained, gray (SP)		21		XI			1 4				
 		WE.		- 1	$/\ ackslash$			*				
864.5		F'	22	301	abla	8	NP	2 5	17	0.0		
863.5			23		X	Ì		4				
\ 		E.			$/ \bigvee$			3				
862.5	Boring terminated at 24 feet and tremmie grouted with cement-bentonite grout.	1	24									
	groated with cement-bentonite groat.											
]		
11												
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1		1							}	İ		
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0												
U A A												
angale D.L.E'Alput project D.Wesar project natural data Jobs												

	Ve	Salinc environmental risk ma	NAGEMENT	I	Field	i Bo	orin	ıg L	.og		Page1 _ of2	_
		3709.001 County Boo			g No.		G-1	4-98	3	_ Mo	nitor Well No	
1		Enviro-Chem Superfund Site										_
	Surface Ele	vation 887.5 Completion Depth 2	24.0 ft bgs	Auge	r Dep	th	22	ft b	gs_	_ Rot	tary Depth <u>ft bgs</u>	_
	Quadrangle	Rosston Sec. T.	R	Date	: Stari		2/1	0/98	3	Fini	ish2/12/98	_
1	UTM (or Sta	ate d. N.(X) <u>921818.7</u> E.(Y) <u>725</u> 8		Wate	r Leve	el:						_
1		39° 57 Longitude 86° 1									<u> </u>	
1		ation Southern Concrete Pad Excavation Area				MA اق	PLI	=5		Γ .	PERSONNEL	
ı		ipment and Method CME-75			2	Sample Recovery (inches)		1	.	ga .	Geologist - Steve Conwa Driller - Dave Ellis	Y
	Diming Equi	ONE 75	Graphic Log Depth	Sample No.	Sample Type	Very	sf)	N Value (blows/6")	ture ant (9	PID Reading (ppm)	Helper - Justin Helper -	
l	Elevation	DESCRIPTION OF MATERIALS	Con Gray	Samp	Samp	Samp	Q T	N Va (blow	Mois Cont	PIO F	REMARKS	\dashv
		SILTY CLAY FILL hard, brown (CL-ML FILL)		219			4.5+	3	15			٦
	886.5		1		V		Р	3 4				
	FΙ				/			7				
Ì	885.5		2 2	220		22	5.0		9	575		
	884.5	Gravel lens at 3 feet.	% 3	,	$ \bigvee $			6 8				
	F	Graveriens at 3 reet.			$ /\rangle $			9				
	883.5	LEAN CLAY with Sand hard, gray (CL)	4	221		24	5.0		11	107		Ì
	882.5		1 5		$ \bigvee $			7				
	=				$ \Lambda $			11				İ
	881.5		6	238	(-)	22	4.0	6	10	-		
	880.5		7		$ \bigvee $			10				
					$ \Lambda $			10			12" Steel Casing installed to 7 feet.	
	879.5		8 - M	239	$\langle - \rangle$	17	4.5	3	10	-	-	
	E		* 9					5			\$	
	878.5		WE 3	'	$ \Lambda $			9				
	877.5	LEAN CLAY with Sand hard to very stiff,	10	0 240	$\left(\cdot \right)$	18	4.0	4	9	-		
١	E	gray (CL)			IV			6 10	l			
١	876.5		1	'	$ \Lambda $			9				
	875.5	Sand lens at 13 feet.	1:	2 241		24	5.0	ST	8	_		
	E		///									
		UW = 140.3 pcf SG = 2.71	1	3					İ			
	873.5	CLAYEY SAND loose, gray (SC)	1	4 242		19	3.3	4	15	-	-	
3/0/2	F				V			4 3				
5	872.5		//E ¹	5	$ \bigwedge $			7				
ğ. 13	871.5	SANDY CLAY stiff, gray, trace sand and	1	6 243	<u>, </u>	22	2.2	3	10	-	-	
Mar pro	E	gravel (CLS)						6				
Š	870.5		## 1	7	$ \lambda $			6 7				
t projec	869.5		1	8 244	<u> </u>	21	1.7	0	11	-	4	
EA OF	E	LEAN CLAY with Sand stiff, gray (CL)			\mathbb{N}	-	'''	3				
template ID:ILEPA\gint project ID:\Versar project no:\\run date:3/6/90	868.5	LET IT OLEN WITH Daily Still, Slay (OL)	1	9	X			5				
temple	<u> </u>	<u> </u>			<u> </u>							
1		VERSAR, INC.; 200 W. 22nd Stree	t; Suite 250	; Lom	bard,	IL 60	148	: 63	0/26	8-85	55	

Ve	Saling environmental risk ma	NAGEMENT	F	ield B	oring	Log	Page2_ of2_
	3709.001 County Boo			g No	G-14-9	8 Mo	onitor Well No.
	ne Enviro-Chem Superfund Site						
Surface Ele	vation 887.5 Completion Depth	24.0 ft bgs	Auge	r Depth _	22 ft t	igs Ro	tary Depth <u>ft bgs</u>
Quadrangle	Rosston Sec T	R	Date:	Start	2/10/9	8 Fin	nish2/12/98
UTM (or St			Wate	r Level:			
	39° 57' Longitude 86° 1						PERSONNEL
	etion Southern Concrete Pad Excavation Area			8		ΤТ	Geologist - Steve Conway
Drilling Equ	ipment and Method CME-75		ا ہ	Sample Type Sample Recovery (inches)	_		I = =
		Graphic Log Depth	Sample No.	Sample Type Sample Recovery (inc	tsf)	Moisture Content (%) PID Reading (ppm)	Helper - Justin Helper -
Elevation	DESCRIPTION OF MATERIALS	Pe Co	Sam	Sam	Op (tsf) N Value	S S S g	REMARKS
	LEAN CLAY with Sand stiff, gray (CL)		245		1.7 0	12	
866.5		21		X	4		-
				/	7		
865.5	POORLY GRADED SAND medium to coarse grained, medium dense, gray (SP)	F 22	246	15	NA 6	7	1
864.5	gramed, medium dense, gray (Sr)	E 23	3	ΙXΙ	6		
		E		/ \	8		
863.5	Boring terminated at 24 feet and tremmie	24	1			1-1-	1
	grouted with cement-bentonite grout.						
						}	
		1			1	1	
		1			} .}		
}		1	1			}	
				.			
		}				1 1	
						}	
			}				
{							

VC	MG ENVIRONMENTAL	. RISK MAN	NAGEN	MENT	•	-ieic	ים ג	orin	ıg L	.og		Page1	of	
					Boring No. G-15-98 Monitor Well No.								·	
Project Nan	ne Enviro-Chem Superfu	ınd Site			Site L	.ocati	on _	US 421,				, Zionsville, Indiana		
Surface Ele	vation 884.6 Comple	tion Depth <u>2</u>	4.0 ft	bgs	Auge	r Dep	th	22	ft b	gs	_ Rot	ary Depth _	ft bgs	
luadrangle	Rosston Sec.	_ τ	R		Date:	Start	t	2/1	1/98	3	_ Fini	ish 2/13	3/98	
ITM (or St	ate rd. N.(X) 921739.9 E.(Y)				Wate	r Leve	el:							
										-				
	39° 57' Longitude					S	AM	PLI	ES			PER	SONNE	
-	Southern Concrete Pad Excav	ation Area				o	Sample Recovery (inches)					Geologist - Driller -	Steve Conv Dave Ellis	
rilling Equ	ipment and Method <u>CME-75</u>		ار	ر (sg	2 Z	θ Τγς	e Bry (i	=	(e_)	ire 14 (%	adin	Helper -	Justin	
	DECODIDETION OF MATER	51410	Graphic Log	Depth (feet bgs)	Sample No.	Sample Type	amp	t) (ts	N Value (blows/6")	foist. onte	PID Reading (ppm)	Helper -	NA A DICC	
Elevation	DESCRIPTION OF MATE LEAN CLAY with Sand hard, brown,			<u>_ = =</u>	229			4.5+		≥ ປ 11			MARKS	
	gravel (CL)	iracc				\setminus / \mid	_ `	Р	4	, ,				
-883.6				1		ΙXΙ			5 9					
-882.6				_ _ _ 2		\triangle								
002.0					230	\	24	4.5 P	4 6	12	342	:		
-881.6				3		ΙΧ'			7					
				-		$/ \setminus$			9					
-880.6				_ 4	231	()	24	4.5	4	11	50			
-879.6				_ _ _ 5		V		Р	7 10		}			
-6/3.0				_		$ \Lambda $			6					
-878.6	LEAN CLAY with Sand gray, trace gr	ravel		_ 6	247	$\langle - \rangle$	17	3.0	4	11				
<u>.</u>	(CL)	avei		=		\setminus	''		4					
877.6				_ 7		X			5 6			12" Steel Ca	asing installe	
876.6				_ _ _ 8		$V \setminus$					_	to 7 feet.		
-8/6.6				_	248	\	19	2.1	3 4	11				
- -875.6				_ 9		ΙX			5	<u> </u>				
				Ξ		$ /\rangle$			5					
874.6	SANDY SILTY CLAY gray, trace grav	/el		<u> </u>	249		24	1.2	ST	12	NP	LL = 17, Pl =	: 5	
	(CL-ML)			E 11								50% Sand 29% Silt		
- 3/3.6	UW = 144.8 pcf SG = 2.73											21% Clay		
872.6	Sand lenses at 11.5 and 11.8 f	feet		12	250		20	1.3	4	11		1		
<u>-</u>				_ _	1	$\backslash /$.		4	''				
- - 871.6				<u> </u>		X			5					
- - -870.6	Sand lens at 13.5 feet.			E 14		V]		
- 0,0.0				_ '~	251	Λ /	21	1.7	1 2	11		ļ		
869.6				<u> </u>		ΙX			4					
-	0			E		$ / \setminus$			5					
—868.6 —	Sand lens at 15.9 feet.			<u> </u>	252		19	1.7	2			1		
- - 867.6				E 17	,	$ \bigvee$			3					
				Ė ''		$ \Lambda $			4					
866.6	SANDY CLAY stiff, gray, trace grave			E 18	253		24	1.7	1	-	<u> </u>	1		
- -	(CL-SC)	.		E		$\backslash /$			1					
865.6 				- 19		X			2 2					
_	Sand lens at 19.5 feet.			E	1	$V \setminus$	J		}					

Ve	1.23	INC. ENV	IRONMENTAL	RISK MA	NAGEN	MENT	F	ielo	B	orin	g L	.og		Page	2 of	2
			County					g No.		G-1	<u>5-98</u>	3	_ Moi	nitor Well No	o	
Project Nar	ne	Enviro-	Chem Superfu	ınd Site			Site L	.ocatio	on .		U	S 42	21, Zi	onsville, l	ndiana	
Surface Ele	vation	884.6	Comple	ition Depth	24.0 ft	bgs	Auge	r Dept	th	22	ft b	<u> </u>	_ Rot	ary Depth _	ft bg	s
		n	Sec	_ т	_ R		Date:	Start		2/1	1/98	3	_ Fini	sh <u>2/1</u>	3/98	
UTM (or St Plane) Coo		921739.	9 E.(Y)	725	302.2		Wate Durin			21.	5 ft	ogs	_ At	Completion	¥ ft	bgs
Latitude	<u>39°</u>	57 '	Longitude	86° 1	<u>6 ·</u>			S	ΔM	PLE	S			PERSONNEL		
1			ete Pad Excav					1	Sample Recovery (inches)					Geologist -	Steve Co	nway
Drilling Equ	ipment and	Method <u>CM</u>	E-75		[o	- -	ģ	Type	V (inc		<u>.</u>	€	PID Reading (ppm)	Driller - Helper -	Dave Elli: Justin	S
					Graphic Log	Depth (feet bgs)	Sample No.	Sample Type	eldm cove	(tst)	Value lows/	oistur ontent	D Rea pm)	Helper -		
Elevation			OF MATE ray, trace grave		[5]	٥٤	رگ 254		21	ð 1,2	z ē	žö	II d	RE	MARK	<u>(S_</u>
E	(CL-SC)	CLAT Still, g	iay, tiace glave	••				\setminus / \mid			1					
863.6						는 21 译		$ \Lambda $			3					
862.6	(SC)	SAND loose	, gray, trace gra	ıvel		_ 22	255	$\left(-\right)$	22	NP	w					
E						Ε,	}	V			о н					
861.6						<u> </u>		$ \Lambda $			• •					
860.6	Boring to	erminated at	24 feet and tre	mmie	11/2	_ 24	-	\leftarrow								
	_		bentonite grou													
					1											
	<u> </u>									}			}			
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5 6																
£																
There are the Argent polect and versal polect movern one account																

VC	NO ENVIRONMENTAL RISK MA	NAGEMENT	Γ	riel	a R	orın	ig L	.og		Page1 _ of2
Project No.	3709.001 CountyBoo	one	Boring No. G-16-98 Monitor Well No.							
roject Nan	ne <u>Enviro-Chem Superfund Site</u>		Site	Locat	ion	US 42				ionsville, Indiana
urface Ele	vation 884.8 Completion Depth	24.0 ft bgs	Aug	er Dep	th	22	ft b	3 5	_ Rot	tary Depth <u>ft bgs</u>
	Rosston Sec. T.	_ R				2/1	0/98	3	_ Fin	ish <u>2/13/98</u>
JTM (or St Plane) Coor	ate rd. N.(X) <u>921672.8</u> E.(Y) <u>725</u> (303.5		er Lev ng Dril		Z18.	0 ft 1	bgs	_ At	Completion <u>T</u> ft bgs
_atitude	39° 57' Longitude 86° 1	6 '	_		Λ N./I	DI I	= 0			PERSONNEL
	ation Southern Concrete Pad Excavation Area		-		2 1V		_3			Geologist - Chris White
	ipment and Method CME-75			8	(inch			%	<u>6</u>	
g		phic th	Ž	Sample Type	very	(sf)	lue vs/6	ture ent (Readi (Helper - Justin Helper -
Elevation	DESCRIPTION OF MATERIALS	Graphic Log Depth	Sample No.	Sam	Sample Recovery (inches)	Op (N S of	Mois Cont	PID I	Driller - Dave Ellis Helper - Justin Helper - REMARKS
=	Crushed Limestone FILL subbase		225			2.25	16	12	0.0	
		₩ E 1		V		Р	9 5	<u> </u> 		
= [$ / \rangle$			4			
882.8	LEAN CLAY with Sand stiff, brown to brown and gray, trace gravel and organics	2	226	$\left\langle \cdot \cdot \right\rangle$	14	1.65	4	17	134	
- - -881.8	(CL FILL)	3		V			2 4			
- 001.0		W E 3					4			
880.8		4	227	$\left\langle \cdot \right\rangle$	17	1.0	2	17	1500	
=				\mathbb{N}		P	1			
879.8 	•	5	1	IX			3		:	
- 878.8		₩ 6		/ \						
			228	Ί\ /	18	NP	2	20	7.0	
877.8	CLAYEY SAND FILL loose, brown and gray,	7	·	X			3			12" Steel Casing installed
	saturated (SC-FILL)	///F .		$V \setminus$						to 7 feet.
—876.8 —	SANDY SILTY CLAY with Sand medium stiff to stiff, brown and gray mottled, trace	8	256		24	0.9	ST	12	NA	LL = 20, Pl = 5 47% Sand
875.8	sand and gravel (CL-ML)	9)							31% Silt
= 1	UW = 139.9 pcf SG = 2.63 Sand lenses at 8.5 and 9.5 feet.									20% Clay
874.8 	LEAN CLAY with Sand very stiff, gray, trace	1	0 25	╅╾	17	2.9	4	11	3.3	
- - 873.8	gravel (CL)	1	1	V			5			
				$ /\rangle$			7			
- 872.8		1	2 258	3	15	2.3	2	12	1.4	-
		1	2	V			3			
- 071.8	Sand lens at 13.5 feet.		3				6			
870.8	Sund lens at 10.0 feet.	1	4 25	- /	19	2.1	3	11	1.4	4
<u> </u>							4			
869.8 		1	5	IÅ			6			
868.8		1	6 26	\ _\	16	2.5	3	11	4.3	4
	SANDY CLAY stiff to very stiff, trace gravel (CL-SC)		201	1\/	′ ′ °	2.5	3	'	4.3	
867.8		1	7	ΙX			5			
866.8		<u> </u>	8	V^{\prime}		_]
- 500.8 -	POORLY GRADED SAND fine to medium grained (SP)		26	'\\ \	21	NP	2	11	1.4	
865.8	g. 2.1.00 (G.)	E ₁	9	χ			3			
E		E E					3			
<u> </u>	VERSAR, INC.; 200 W. 22nd Stree	15.555551 4. Code - 252	 . 1	l be-a	11 64	140		0/20	0 05	

Project No. 3709.001 County Boone Enviro-Chern Superfund Site State Location State Completion Depth 24.0 ft bgs Surface Elevation State Planck Control NIX 921672.8 E/W 725803.5 Date: State Planck Control NIX 921672.8 E/W 725803.5 Drilling Equipment and Method CME-75 Elevation DESCRIPTION OF MATERIALS Drilling Equipment and Method CME-75 Elevation DESCRIPTION OF MATERIALS Drilling Equipment and Method Gray, trace gravel (SP) Boring terminated at 24 feet and tremmile grout.	Ve	Saling environmental risk managi	EMENT	. F	ield	Bor	ing L	.og	Page2 _ of2
Surface Elevation	Project No.	3709.001 County Boone		Borin	g No	G	i-1 <u>6</u> -98	<u> </u>	onitor Well No.
Quadrangle Rosston Sec. T. R. Dete: Start 2/10/98 Finish 2/13/98 Water Level: Drilling Tel. Of this part of the pa	Project Nam	ne Enviro-Chem Superfund Site		Site L	ocatio	n	U	S 421, Z	Zionsville, Indiana
UTM for State Plane (Cord N. IX) 921672.8 E.(Y) 725803.5 During Dimining 218.0 ft bgs At Completion X ft bgs Latitude 39° 57. Longitude 86° 16. SAMPLES PERSONNEL Boring Location Southern Concrete Pad Excavation Area Drilling Equipment and Method CME-75 Elevation DESCRIPTION OF MATERIALS DESCRIPTION OF MATERIAL	Surface Ele	vation 884.8 Completion Depth 24.0	ft bgs	Auge	r Depti	h	22 ft bç	ıs Ro	tary Depth <u>ft bgs</u>
Planel Coord, NIXI 921672.8 E.M 725803.5 During Drilling \$\frac{18.0 \text{ ft bgs}}{2}\$ Latitude 39° 57' Longitude 86° 16' SAMPLES PERSONNEL Boring Location Southern Concrete Pad Excavation Area Drilling Equipment and Method CME-75 Elevation DESCRIPTION OF MATERIALS POORLY GRADED SAND (ine to medium grained, gray, trace gravel (SP) 883.8 882.8 880.8 Boring terminated at 24 feet and tremmile grout.	Quadrangle	Rosston Sec T R		Date:	Start	2	/10/98	Fir	nish2/13/98
Boring Location Southern Concrete Pad Excavation Area Drilling Equipment and Method CME-75 Elevation DESCRIPTION OF MATERIALS POORLY GRADED SAND fine to medium grained, gray, trace gravel (SP) 861.8 Boring terminated at 24 feet and tremmle grouted with cement-bentonite grout. Boring Location Southern Concrete Pad Excavation Area Politics Southern Concrete Pad Excavation Area Geologist - Chris White Driller - Dave Ellis Helper - Justin Helper - Justin Helper - Southern Concrete Pad Excavation Area FEWARKS POORLY GRADED SAND fine to medium grained, gray, trace gravel (SP) Boring terminated at 24 feet and tremmle grouted with cement-bentonite grout.			5				8.0 ft l	ogs At	Completion <u>▼ ft bgs</u>
Boring Location Southern Concrete Pad Excavation Area Drilling Equipment and Method CME-75 Elevation DESCRIPTION OF MATERIALS POORLY GRADED SAND fine to medium grained, gray, trace gravel (SP) POORLY GRADED SAND fine to medium grained at 24 feet and tremmile grouted with cement-bentonite grout. Poorly Grade with ceme	Latitude	39° 57' Longitude 86° 16'	*	Γ	54	MP	IFS		PERSONNEL
Boring terminated at 24 feet and tremmile grouted with cement-bentonite grout. 24 19 NP 2 3 5 5 10 1 2.4	Boring Loca	ation Southern Concrete Pad Excavation Area				S			
Boring terminated at 24 feet and tremmile grouted with cement-bentonite grout. 19 NP 2 3 5 5 8	Drilling Equi	ipment and Method CME-75	-	<u>.</u>	ype	(i)		€ 6 6	1 -
Boring terminated at 24 feet and tremmile grouted with cement-bentonite grout. 19 NP 2 3 5 5 8		phic	t bas	N ejd	T eld		alue ws/6'	sture tent (Read	Helper - Justin
Boring terminated at 24 feet and tremmile grouted with cement-bentonite grout. 19 NP 2 3 5 5 8	Elevation	DESCRIPTION OF MATERIALS		Sam	Sam	Rec	z g	S S S S	REMARKS
863.8	F	PWW)= -	262	1	19 N		0.4	
862.8 861.8 Boring terminated at 24 feet and tremmle grouted with cement-bentonite grout.	863.8	grained, gray, trace gravel (SP)	E 21		XI		5		
Boring terminated at 24 feet and tremmie grouted with cement-bentonite grout.	E		Œ		VV		8		
Boring terminated at 24 feet and tremmie grouted with cement-bentonite grout.	862.8		F 22	263	1	24 N		- 2.4	1
Boring terminated at 24 feet and tremmie grouted with cement-bentonite grout.	861.8		E 23	3	У		5		
grouted with cement-bentonite grout.	E		Œ		/		10		
	860.8		24	·			+		-
		grouted with cement-bentonite grout.							
						. }			
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Ve	VCI SOI NO ENVIRONMENTAL RISK MANAGEMEN					Field Boring Log Page							2
	3709.001 County Boo			g No.		G-1	7-98	7-98 Monitor Well No					
Project Nan	ne Enviro-Chem Superfund Site		Site Location			US 42				21, Zionsville, Indiana			
Surface Ele	vation 884.6 Completion Depth	24.0 ft bgs	Auger Depth		th	22 ft bgs			_ Rot	tary Depth	f	t bg	s
Quadrangle	Rosston Sec. T.	_ R	Date:	Start	·	2/1	1/98	3	_ Fin	ish <u>2/1</u>	8/98		
UTM (or St.	ate d. N.(X) <u>921615.0</u> E.(Y) <u>725</u> 8		Wate	r Levi	el:								
Latitude	39° 57' Longitude 86° 1	6		S	ΔΜ	PI I	FS			PF	RSO	NIN	JFI
	ation Southern Concrete Pad Excavation Area				(8)	<u> </u>				Geologist			
Drilling Equ	ipment and Method <u>CME-75</u>		ا ا	γpe	inch		-	Moisture Content (%)	.i.	Driller - Helper -	Davi		S
		Graphic Log Depth	Sample No.	Sample Type	96 0	(tst)	alue ws/6	sture	PID Reading (ppm)	Helper -	Just	.111	
Elevation	DECOME FIGHT OF MATTERIALS									R	EM/	RK	<u>(S</u>
E	LEAN CLAY FILL with Sand very stiff, brown and gray (CL FILL)		235		14	.41 B	-	23	NA			-	
883.6	, (oz., , oz., ,	1		X						Ì			
E				V V									
882.6 		2 2	236	$\sqrt{2}$	14	2.0 P	1 2	15	NA	1			
881.6	Gray staining at 3 feet and 3.9 feet	3		X			1						
E	-			$V \setminus$			4						
880.6			237		16	2.8 B	2 5	16	NA	1			
879.6		5		Х	j		5						
E				$/\backslash$			7						
878.6	LEAN CLAY stiff, brown and gray mottled	6	264		20	1.3		-	25	1			
877.6	(CL)	7		$ \chi $,	В	3			12" Steel	Caeinn	inet	halle
				/			5			to 7 feet.	Casing	11136	alleu
876.6	LEAN CLAY soft to medium stiff, brown and	8	265		15	.5	1	-	1000	5			
875.6	gray mottled (CL-ML)	9 = A	.	$ \bigvee $		P	2 2						
E				//			2						
874.6		10	266	$\langle \cdot \rangle$	13	.5	2	+-	1000	5			
873.6		1	1	V		Р	1 2		į	Sample ha	s shee	n.	
E				$ \wedge $			2						
872.6	LEAN CLAY stiff to very stiff, gray, trace	12	2 267	$\langle \cdot \rangle$	24	1.5	4	-	1000	5			
871.6	sand and gravel (CL)	1:	3	V		В	6			Sample wi	th she	en ar	nd
E				$ \wedge $		ļ	7			logorous.			
870.6		14	4 268	$\langle - \rangle$	20	1.2	2	-	1000	5			
869.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5	V		В	3 4						
203.0			١	$ \Lambda $			6						
868.6		11	6 269	$\langle \cdot \rangle$	21	2.1	1	-	208	-			
E			,	V		В	3						
—867.6 —		1	1	$ \wedge $			5			-			
866.6	Sand lens at 17.7 feet.	11	8 270	$\left\langle -\right\rangle$	19	2.2	2	 _ -	158	4			
E			ĺ	\mathbb{N}		В	3						
865.6		1	9	$ \dot{\Lambda} $			5						
E		///// 2		<u> </u>	L	<u></u>		1		<u> </u>			
	VERSAR, INC.; 200 W. 22nd Stree	t; Suite 250;	; Lomi	oard,	IL 60	148	1; 63	0/26	8-85	55			

Ve	MC ENVIRONMENTAL RISK MA	NAGEMENT	r *	-ieid	BC	orın	gL	og		Page	2 of2	
1	3709.001 County <u>Boo</u>										·	
Project Nan	ne <u>Enviro-Chem Superfund Site</u>		Site L	.ocatio	on _		U	S 42	21, Zi	onsville, lı	ndiana	
Surface Ele	vation 884.6 Completion Depth	24.0 ft bgs	Auge	r Dept	h	22 ft bgs				Rotary Depth ft bgs		
	Rosston Sec. T.	_ R	Date:	Start r Leve		2/1	1/98		_ Fini	sh <u>2/11</u>	8/98	
Plane) Cool	rd. N.(X) 921615.0 E.(Y) 7258	319.9	Durin	g Drilli	ing 🔽	20.0	ft b	ogs	_ At	Completion	¥ ft bgs	
Latitude	39° 57' Longitude 86° 1	<u>6 ·</u>		SA	λM	PLE	S			PEF	RSONNEL	
Boring Loca	ation Southern Concrete Pad Excavation Area	<u> </u>			ŝ						Chris White	
Drilling Equ	ipment and Method <u>CME-75</u>		ا و	Sample Type	Sample Recovery (inches)	- 1		€	ling	Driller - Helper -	Dave Ellis Justin	
		Graphic Log (Depth	Sample No.	nple.	over	Op (tsf)	ws/6	sture	PID Reading (ppm)	Helper -	Justini	
Elevation	DESCRIPTION OF MATERIALS	2 2 5		San	R G	ਰੈ		ខ្ទី		RE	MARKS	
E	POORLY GRADED SAND medium tto coarse grained, medium dense, gray (SP)	E	271	Λ	8	NP	0	-	68		į	
863.6		<u></u> 2	1	XI		l	2					
E		₩ŧ.		VV								
862.6		₩E*	2 272	1		NP	3 4	-	1.7	i		
861.6		2:	3	$ \chi $	1		7			1		
E		E.		VV								
860.6	Boring terminated at 24 feet and tremmie grouted with cement-bentonite grout.	2	4									
	grouted with cement-pentonite grout.		İ				}				:	
		1										
		}			1							
					ļ	}					!	
					1	ļ					:	
					1		Ì					
					ļ	į	1					
11										<u> </u>		
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			1		ĺ							
.			-		İ					j		
										}		
3		}										
And a second												
iemplate DJ.EFAlgrit project DJ.Versar project notivum date. DDJs						İ						
PA PA												
empla:												

Ve	Sales ENVIRONMENTAL E	RISK MAI	NAGEI	MENT	F	Field	d B	orin	ng L	.og		Page _ 1 _ of _ 2		
	3709.001 County					g No.		G-1	8-98	3	_ Mo	nitor Well No.		
Project Nam	neEnviro-Chem Superfun	d Site			Site Location US 42			21, Zionsville, Indiana						
Surface Ele	vation 884.4 Completic	on Depth <u>2</u>	24.0 ft	t bgs	Auger Depth _			22	ft b	gs	_ Ro1	ary Depth <u>ft bgs</u>		
Quadrangle	Rosston Sec.	т	_ R		Date:	Star	t	2/1	1/98	3	_ Fini	ish2/16/98		
UTM (or Sta	ate d. N.(X) <u>921601.4</u> E.(Y)				Wate	r Lev	el:							
	39° 57' " Longitude 8													
	ition Southern Concrete Pad Excava				-	5	AIVI g	PLI	<u> </u>			PERSONNEL Geologist - Steve Conway		
	pment and Method CME-75				ا . ا	e d.	Sample Recovery (inches)			%	Ş.	Driller - Dave Ellis		
Drining Equi	priorit una metrioa <u>Oriz 70</u>		Graphic Log	Depth (feet bgs)	Sample No.	Sample Type	very	st)	N Value (blows/6")	ture ent (PID Reading (ppm)	Helper - Justin Helper -		
Elevation	DESCRIPTION OF MATER	IALS	Gag Gag	Dep	Samp	Samp	Samp	Qp (tsf)	N Va	Mois	PIO P	REMARKS		
E	LEAN CLAY FILL medium stiff, brown,			[232		22	.41	1	17	56	TILIVI III.		
883.4	sand and roots (CL)			£ 1		Y		В	1 2					
E						$ \wedge $			5					
882.4				仁 2	233	$\langle - \rangle$	8	1.0	2	20	3.1			
881.4				E 3		V		Р	1 2					
E **				E,					4					
880.4	LEAN CLAY very stiff, brown, trace sa	and		= 4	234	$\langle - \rangle$	22	3.1	5	12	0.0			
	and gravel (CL)			£ _		$ \setminus /$		В	6		}			
879.4				5		M			9	 				
878.4				E 6	273	$\langle \cdot \rangle$	24	2.6	5	<u> </u>	391			
E				E	2/3	\mathbb{N}	27	B B	7	-	331			
877.4				₹ 7		ľĂ			10	l 		12" Steel Casing installed		
876.4	- 			£ 8	224			2.1	_		1	to 7 feet.		
F	LEAN CLAY very stiff, gray, trace grav (CL)	vei .		#	274	N/	21	2.1 B	4	-	12			
875.4				£ 9		X	}		6					
874.4				E 10	,	V								
E "				£ '`	275	N /	21	4.7 B	6	-	177			
873.4				11		X			8					
872.4	SILT medium dense, gray, trace grave	I (ML)		E ¥12		$/ \setminus$								
E 8/2.4	POORLY GRADED SAND medium to c grained, medium dense, trace gravel,	oarse			276	\ /	17	NP	2	-	400			
871.4	saturated (SP)			13	3	X			7 8					
E				F.,		$V \setminus$				}	_			
870.4				<u> </u> 14	277	1	24	NP	8	-	3000			
869.4				E 15	5	ΙX			12					
				E		//	}		14	}	ļ			
868.4				 - 16	278	1	24	NP 4.0	10	-	3000	5		
867.4				E 17	,	IX		4.0 P	6					
	LEAN CLAY very stiff to hard, gray (C	CL)	11111	E		//			8			1		
866.4	,			- 18	279	1	15	2.2	1	·	2000	Oily sheen on sample.		
867.4 				£ 19	•	$ \bigvee$		P	4					
E				生 ($ /\rangle$			6					
	VERSAR, INC.; 200 W. 2	2-d 64	<u> </u>	250	<u> </u>	<u>Y</u>	11 24	1146	1. 62	0/26	Q_0E	<u> </u>		

Ve	Sale Mc environmental risk man	IAGEMENT	. F	ield	Borin	g Log		Page2_ of2
	3709.001 County Boon			No	G-1	8-98	_ Mo	nitor Well No
Project Nam	ne <u>Enviro-Chem Superfund Site</u>		Site L	ocation		US 4:	21, Z	ionsville, Indiana
Surface Ele	vation 884.4 Completion Depth 2	4.0 ft bgs	Augei	Depth	22	ft bgs	_ Rot	ary Depth <u>ft bgs</u>
	Rosston Sec. T.	R	Date:	Start_	2/1	1/98_	_ Fini	ish <u>2/16/98</u>
UTM (or St. Plane) Coor	ate d. N.(X) <u>921601.4</u> E.(Y) <u>7258</u> !	51.3	Water During	r Level: g Drilling	<u> </u>	0 ft bgs	_ At	Completion <u>▼ ft bgs</u>
Latitude	39° 57' " Longitude 86° 16	·	Г	SA	MPLI	-S		PERSONNEL
1	ation Southern Concrete Pad Excavation Area				S			Geologist - Steve Conway
Drilling Equ	ipment and Method <u>CME-75</u>	0 3	ا و	Sample Type Sample	(inc)	£ 8	guij	Driller - Dave Ellis Helper - Justin
		Graphic Log Depth	Sample No.	Sample Type	Recovery Op (tsf)	N Value (blows/6") Moisture Content (%)	Read m	Helper - Sustin
Elevation		2 2 2 8						
IE I	LEAN CLAY very stiff to hard, gray (CL)		280	\ /\ '	4 2.5 P	2 -	2000	Sample with oily sheen
863.4		21		X		3 6		and strong odor.
862.4	·	///E 22						
= 002.4		////E **	281	\	6 2.5 P	3 - 5	9000	Sample with sheen and
861.4		23	3	XI		6	•	lodor.
860.4		///E 24		$\triangle V_{-}$			l 	
860.4	Boring terminated at 24 feet and tremmie grouted with cement-bentonite grout.	24						
	ground with committee same many						1	
					Į			
f								
templete D.: ErfAgert propett DAVVERSE Project novvers care								
<u> </u>						<u> </u>		

Ve	Na environmental risk ma	NAGE	MENT	F	iel	d Be	orir	ıg L	.og		Page	l of2_
	3709.001 County Boo				g No.		G-1	9-98	3	_ Mo	nitor Well No	. Pump Well
İ	me Enviro-Chem Superfund Site											
Surface Ele	evation Completion Depth	37.0 ft	t bgs	Auge	r Dep	th	35	ft b	gs	_ Rot	tary Depth _	ft bgs
Quadrangie	Rosston Sec. T.	_ R		Date:	Star	t	2/1	2/98	3	_ Fin	ish	
UTM (or St Plane) Coo	tate rd. N.(X) <u>921433.4</u> E.(Y) <u>7259</u>	907.8		Wate Durin	r Lev g Dril	el: ling <u>T</u>	<u>210.</u>	0 ft	bgs	_ At	Completion	▼ ft bgs
Latitude	39° 57' Longitude 86° 1	<u>6 '</u>			S	ΔΜ	PI I	=5			PEF	SONNEL
	ation Southern Concrete Pad Excavation Area			$\overline{}$	- O	(8)					Geologist -	Steve Conway
Drilling Equ	ipment and Method <u>CME-75</u>	<u></u>	T =	ا فِي	lype	(inc)		£.	(%)	<u>gri</u>	Geologist - Driller - Helper - Helper -	Dave Ellis Justin
ļ		Graphic	Depth (feet bgs)	Sample No.	npte	aple oven	(tst)	/alue ws/6	isture Itent	m)	Helper -	Justin
Elevation	DESCRIPTION OF MATERIALS			Sar	Sar	S &	ð	N Q	Ş Co	문호	RE	MARKS
	6" CONCRETE above limestone subbase.	4.4.4	Ė								ļ	
		4.4.	E 1									
	SANDY LEAN CLAY very stiff to hard,		<u></u>							-	į	
<u> </u>	brown to brown and gray mottled, little gravel (CL)		= -	222	\setminus	18	1.75 P	5		1.0		
	910701 (02)		3		X			5 3				
E			E 4	223		20	4.1	4		1.0		
			E	223	\setminus	20	4.1	3		1.0	ĺ	
lE :			5		X			7 6				
			<u>‡</u> 6	224		17	3.72	3		1.0		
			=	224	\setminus] '	3.72	6		1.0		
	Grades to gray		 7		X			7 9		}	15" Steel C	asing installed
			E 8	282		21	6.77	3		0.0	to 7 feet.	
IE I			E		$ \setminus /$		В	6		0.0		
I E			= 9	Į.	Å			9				
	POORLY GRADED SAND medium to coarse		<u>¥</u> 10	283	()	12	NP	7	ļ	0.0	1	
	grained, loose, gray, trace gravel, saturated		Ε		$\backslash /$			5		0.0		
	(SP)		11 		M	:		6		t 		
1=			E 12	284	$\left\langle -\right\rangle$	12	NP	5		0.0	-	
E			Ė,	,	V			4 5	t 			
1E			13 	?	Μ			8				
			<u> </u> 14	↓	<u> </u>	╀—	_	-		-	4	
E			E 15		<u> </u>							
E			Ε'	285	N /	18	NP	1		0.0		
			E 16	3	X			6 8				
E			E E 17	,	<u> </u>	<u> </u>	<u> </u>		<u></u>		_	
			Ė.									
			<u> </u>	286		6	NP	2	-	0.0	1	
E			E - 19	9	$ \bigvee$			2 2			}	
			E		$ /\rangle$			3				
'	VERSAR, INC.; 200 W. 22nd Stree	t: Suite	250:	Lomb	ard.	IL 60	148	: 63	0/26	8-855	 55	

•	ne Enviro-Chem Superfund Site			Site L	.ocati	on _			15 4	<u> 21, Z</u>	ionsville, Indiana
rface Ele	evation Completion Depth	37.0 ft	bgs	Auge	г Дер	th	35	ft b	gs	_ Rot	tary Depth ft bgs
	Rosston Sec T	_ R					2/1	2/98	3	_ Fini	ish
FM (or St ane) Coo	rate rd. N.(X) <u>921433.4</u> E.(Y) <u>725</u> 9	907.8		Water During			<u> 10.</u>	0 ft	bgs	_ At	Completion <u>▼ ft bgs</u>
titude	39° 57' " Longitude 86° 1	6 '			-	AM	DI I	<u>=</u>			PERSONNEL
	ation Southern Concrete Pad Excavation Area			\vdash		8	<u>, L</u>				Geologist - Steve Conwi
illing Equ	sipment and Method <u>CME-75</u>	Graphic Log	Depth (feet bgs)	Sample No.	Sample Type	Sample Recovery (inches)	tsf)	N Value (blows/6")	iture tent (%)	PID Reading (ppm)	Driller - Dave Ellis Helper - Justin Helper -
levation	DESCRIPTION OF MATERIALS	Gra	Dep (feet	Sam	Sam	Sam	ď	N Q	Mois	Or (p	REMARKS
-	POORLY GRADED SAND medium to coarse grained, loose, gray, trace gravel, saturated (SP)		21	287			NP	2		0.0	
_	•		22		\bigvee			2 4 6			
-			23 - - 24	288		0	NP			0.0	
			25 - 25 - 26		\bigvee						
- -			E	289	7	8	NP	2 2		0.0	
-			28 - 29		\bigvee			12			
.			E								
-	Grades to dense SAND		- 30 - 31 - 31	290	X	21	NP	2 12 23 24		0.0	
• - • • •			32	291		20	NP	7 6 8	-	0.0	
.			34		\bigwedge			11			1
- - - - - -			35	232	X	14	NP	12 31 35 50		0.0	
•	LEAN CLAY hard, gray (CL)	11111	¥		$V \setminus$			30			
_	Boring terminated at 37 feet and tremmie grouted with cement-bentonite grout.		37								

PROJECT TITLE ENVIRO-CHEM WELL NO. PW BORING NO. PW COMPLETED 2-17-98 DATE STARTED 2-17-98 LOCATION ZIONSVILLE, IN DRILLING CONTRACTOR PHILIP ENVIRONMENTAL DRILLER DAVE ELLIS, RIG No. CME-75 METHOD HSA FLUIDS NONE GEOLOGIST STEVE CONWAY, HANDEX COMMENTS APPROXIMATE N 921,743+ E 725,917+ PROTECTIVE RISER CAP TOP OF CASING ELEVATION TBD APPROXIMATE EXISTING GROUND SURFACE EL.883.8±MSL KIKU KIKA VKIK VIKIK PLUG 15" DIA. BENTONITE/CEMENT STEEL CASING BOREHOLE DIAMETER 9 3 BENTONITE SAND - BOTTOM OF BORING WELL CONSTRUCTION NOTES: 1. TYPE RISER ABOVE W.T. 6" PVC 2. TYPE RISER BELOW W.T. 6" PVC RISER STACK MONITORING WELL 3. TYPE OF SCREEN 0.010" CONT. SLOT PVC INSTALLATION DIAGRAM 3. TYPE OF PROTECTIVE CASING STEEL 4. ELEVATION OF WATER 878.74 FT MSL. 5. WATER LEVEL READING ON 8.3 FT BELOW TOC FEB 24, 1998

APPENDIX C

SUMMARY OF SHALLOW SOIL TEST DATA TABLES LABORATORY TESTING SHEETS

ENVIRO-CHEM SUPERFUND SITE SUMMARY OF SHALLOW SOIL TEST DATA VERSAR PROJECT NO. 3709.911

TABLE 3 - MOISTURE (%w) and SATURATION (%S)

Boring No.

Sample Depth	G-1-98	G-2-89	G-3-98	G-4-98	G-5-98	G-6-98	G-7-98	G-8-98	G-9-98	G-10-98	G-11-98	G-12-98
0 - 2	11	15	21	16	13	15	-	16	-	13	21	13
2 - 4	13	-	18, 93	16	14	11	16	20	11, 99	17	12	10
4 - 6	13	15	21	17	11	12	14	12	11	21	10	-
6 - 8	35, 79	21	21, 100	39	11	13	11	13	11, 100	12	11	9
8 - 10	22, 122**	25**	18**	25, 86 **	11, 89	9	11, 99	13, 95	12	9, 78	11	10
10 - 12	12, 29	-	13, 80	12, 100	11	11, 99	9	11	11, 91	10	12, 100	11
12 -14	10	9, 90	9	10	10	12	10	11	11	11	11	11

Boring No.

	Sample Depth	G-13-98	G-14-89	G-15-98	G-16-98	G-17-98	G-18-98	
•	0 - 2	8	15	11	12	_	17	
	2 - 4	10	9	12	17	15	20	
	4 - 6	10	11	11	17	16	12	
	6 - 8	11	10	11	20	-	-	
	8 - 10	12	10	11	12, 100	-	-	
	10 - 12	12	9	12, 100	-	-	-	
	12 - 14	12	8, 72	11	-	_	-	

Bold Results are saturated samples.

Water Level in Creek at Elevation 877.8 ft MSL.

^{* =} Pending Test Results.

^{** =} Test result from same elevation as water level in creek.

ENVIRO-CHEM SUPERFUND SITE SUMMARY OF SHALLOW SOIL TEST DATA VERSAR PROJECT NO. 3709.911

TABLE 4 - UNCONFINED COMPRESSIVE STRENGTH DATA Q_U (Tons per Square Foot, TSF)

Sample Depth		Boring No.												
0 - 2	2.5 P	0.75B	1.0 P	2.O P	2.0 P	•	•	0.4 B	-	-	•	5.0 P		
2 - 4	2.0 P	1.75 P	1.5 P	0.75 B	3.0 P	-	2.4 B	.33 B	4.5 P	1.0 B	3.5 P	3.7 B		
4 - 6	2.5 P	1.6 B	2.0 P	1.0 P	4.5 B	2.4 S	2.1 S	3.1 B	2.5 P	0.7 B	2.0 P	•		
6 - 8	1.5 B	1.4 B	1.9 B	1.2 B	1.6 S	2.6 B	4.0 B	4.5 P	4.1 B	5.8 B	1.7 B	1.2 B		
8 - 10	1.5 P**	0.5 P**	NP**	0.3 B**	3.2 B	3.0 B	2.5 B	3.0 B	2.5 P, NP	P	2.9 B	3.0 B		
10 - 12	6.5 S	NP	4.1 B	4.5+ P	3.1 B	1.8 B	NP	3.0 P	NP, 2.0 B	NP	2.8 B	2.6 B		
12 -14	NA	1.O E	2.2 S	NP, 4.5+P	3.5 P	1.7 B	NP	NP	1.4 B	3.3	1.3 P	1.7 B		

Boring No.

mple Depth	G-13-98	G-14-89	G-15-98	G-16-98	G-17-98	G-18-98
0 - 2	4.5 P	4.5 P	4.5 P	2.25 P	.41 B	.41 B
2 - 4	4.5 P	5.0 B	4.0 P	1.65 B	2.0 P	1.0 P
4 - 6	3.5 B	5.0 B	4.5 P	1.0 P	2.8 P	3.1 B
6 - 8	2.5 B	4.0 B	3.0 B	NP	1.3 B	2.6 B
8 - 10	2.1 B	4.5 B	2.1 B	0.9 B	0.5 P	2.1 B
10 - 12	1.7 B	4.0 B	1.2 B	2.9 B	0.5 P	4.7 B
12 -14	1.7 B	5.0 B	1.3 B	2.3 B	1.5 B	NP
	0 - 2 2 - 4 4 - 6 6 - 8 8 - 10 10 - 12	0 - 2 4.5 P 2 - 4 4.5 P 4 - 6 3.5 B 6 - 8 2.5 B 8 - 10 2.1 B 10 - 12 1.7 B	0 - 2	0 - 2 4.5 P 4.5 P 4.5 P 2 - 4 4.5 P 5.0 B 4.0 P 4 - 6 3.5 B 5.0 B 4.5 P 6 - 8 2.5 B 4.0 B 3.0 B 8 - 10 2.1 B 4.5 B 2.1 B 10 - 12 1.7 B 4.0 B 1.2 B	0 - 2 4.5 P 4.5 P 4.5 P 2.25 P 2 - 4 4.5 P 5.0 B 4.0 P 1.65 B 4 - 6 3.5 B 5.0 B 4.5 P 1.0 P 6 - 8 2.5 B 4.0 B 3.0 B NP 8 - 10 2.1 B 4.5 B 2.1 B 0.9 B 10 - 12 1.7 B 4.0 B 1.2 B 2.9 B	0 - 2 4.5 P 4.5 P 2.25 P .41 B 2 - 4 4.5 P 5.0 B 4.0 P 1.65 B 2.0 P 4 - 6 3.5 B 5.0 B 4.5 P 1.0 P 2.8 P 6 - 8 2.5 B 4.0 B 3.0 B NP 1.3 B 8 - 10 2.1 B 4.5 B 2.1 B 0.9 B 0.5 P 10 - 12 1.7 B 4.0 B 1.2 B 2.9 B 0.5 P

Bold Results from Unconfined Compressive Strength Tests performed according to ASTM D2166-91.

Water Level in Creek at Elevation 877.8 ft MSL.

P = Penetrometer Test Result

B - S = Bulge or Shear failure from field Rimac Compression Test.

^{* =} Test result pending.

^{** =} Test result from same elevation as water level in creek.

ENVIRO-CHEM SUPERFUND SITE SUMMARY OF SHALLOW SOIL TEST DATA VERSAR PROJECT NO. 3709,911

TABLE 5 - UNIT WEIGHT (UW, Pounds per cubic foot, PCF) and SPECIFIC GRAVITY (SG, Unitless)

						Boring	g No.					
Sample Depth	G-1-98	G-2-89	G-3-98	G-4-98_	G-5-98	G-6-98	G-7-98	G-8-98	G-9-98	G-10-98	G-11-98	G-12-98
0 - 2												
2 - 4			131, 2.72									
4 - 6	134, 2.76											
6 - 8	128, 2.70		129, 2.64				144, 2.69					
8 - 10				121, 2.74	144, 2.80			144, 2.76		133, 2.75		
10 - 12	99, 2.76**		138, 2.74 **	147, 2.80**		144, 2.67					145, 2.70	
12 -14		147, 2.75										
						Boring	No.					
Sample Depth	G-13-98	G-14-89	G-15-98	G-16-98	G-17-98	G-18-98						
0 - 2							Bold Res	sults from tes	ts on shelhy	tube samples		
2 - 4							2014 110		13 011 311010)	tuoo sumpios	,,	
4 - 6							n - Pandi	ing test result	c			
6 - 8							p - rend	ing test result	S.			
8 - 10				140, 2.63								
10 - 12			145, 2.73									
12 - 14		140, 2.71										

Bold Results are saturated samples.

Water Level in Creek at Elevation 877.8 ft MSL.

^{* =} Pending Test Results.

^{** =} Test result from same elevation as water level in creek.

TABLE 6 - SOIL SATURATION ENVIRO-CHEM SUPERFUND SITE VERSAR PROJECT NO. 3709.911

Soil Saturation = $S = \%M / [(Den_w/Dry Den_S)-(1/G)]$

Where:

%M = Moisture Content

 $Den_W = Density of Water = 62.4 lb/ft^3$

DUW = Dry Soil Unit Weight in lb/ft³

UW = Dry Soil Unit Weight in lb/ft3

G = Specific Gravity of Solids

Boring #	Sample #	UW	DUW	G	%M_	DenW	Sat.
G-1-98	3	134	118.58	2.762	0.13	62.4	0.7919466
	96	127.6	93.82	2.696	0.36	62.4	1.2238301
	98	99	90.00	2.764	0.1	62.4	0.3016238
G-2-98	153	147	134.86	2.75	0.09	62.4	0.9085631
G-3-98	11	131	111.02	2.717	0.18	62.4	0.9277235
	13	129	106.61	2.639	0.21	62.4	1.0175853
	15	138	124.32	2.739	0.11	62.4	0.8039978
G-4-98	202	120.6	97.34	2.754	0.239	62.4	0.8598161
	203	147	131.25	2.708	0.12	62.4	1.1304507
G-5-98	111	144.2	129.91	2.804	0.11	62.4	0.8892518
G-6-98	162	143.7	130.05	2.67	0.105	62.4	0.9971401
G-7-98	139	143.7	129.46	2.69	0.11	62.4	0.9976694
G-8-98	211	144.3	127.25	2.86	0.134	62.4	0.9521913
G-9-98	8	146	131.53	2.75	0.11	62.4	0.9930075
	29	148	133.33	2.75	0.11	62.4	1.054007
	31	143	128.83	2.75	0.11	62.4	0.9111446
G-10-98	126	133.1	117.79	2.75	0.13	62.4	0.7825163
G-11-98	44	145.1	129.55	2.699	0.12	62.4	1.0796567
G-14-98	241	140.3	129.91	2.709	0.08	62.4	0.7194101
G-15-98	249	144.8	129.52	2.727	0.118	62.4	1.0253138
G-16-98	256	139.9	124.58	2.632	0.123	62.4	1.0169011

Results reported in **bold** indicate soil saturation.

Wang Engineering, INC. Consulting Geotechnical and Environmental Engineers **ATTERBERG LIMITS (ASTM D4318)** (CL) СН 50 40 30 20 10 MH ML CL-ML 20 60 LIQUID LIMIT (LL) 80 100 40

	Sample No./Depth	LL	PL	PI	Fines	USCS Classification
•	G-1-98 8.0'	44	31	13		
I	G-11-98 12.0'	18	12	6		
4	G-15-98 12.0′	17	12	5		
*	G-16-98 10.0′	20	15	5		
	G-4-98 10.0'	29	21	9		
0	G-7-98 11.0'	16	12	4		
T						
	_					

Client	Versar, Inc.		
Project	Envirochem Site	Prepared by	
Location	Zionville, Indiana	Date	3/3/98
Project No.	990-62-01	$\mathcal{O}_{\mathcal{I}}$	7 7 ~ 1
		Checked by Walle	T. tand
		Date	3/3/98

GRAVEL

fine

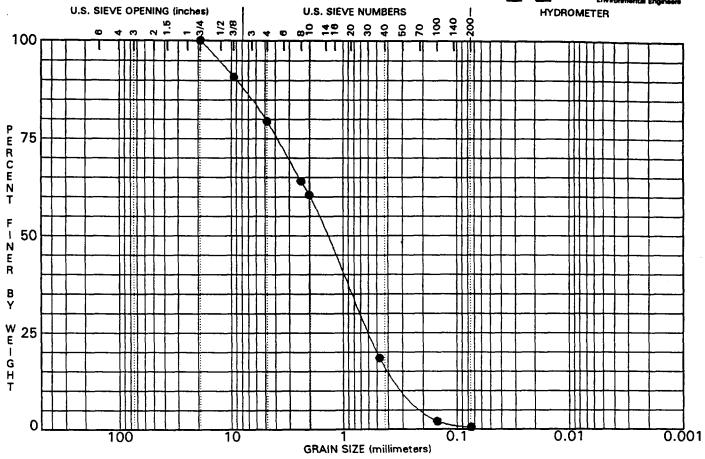
coarse

coarse

COBBLES

Wang Engineering, INC.
Consulting Geotsohrical and
Environmental Engineers

SILT or CLAY



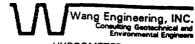
	0.96 7	0					SP	GRAVEL	SAND with	GRADED	POORLY	18.0′	G-2-98	•
			L.,	Ì]]
G-2-98 18.0' 19.00 1.97 0.705 0.2614 20.6 78.8 0 6	%Cla	%Silt	%5	Sand	%S	6Gravel	7 9	D10	D30	D60	D100	Depth	imple No./	Se
	6	0		8.8	78	20.6	1	0.2614	0.705	1.97	19.00	18.0′	G-2-98	•
			%8				9			 				Sa

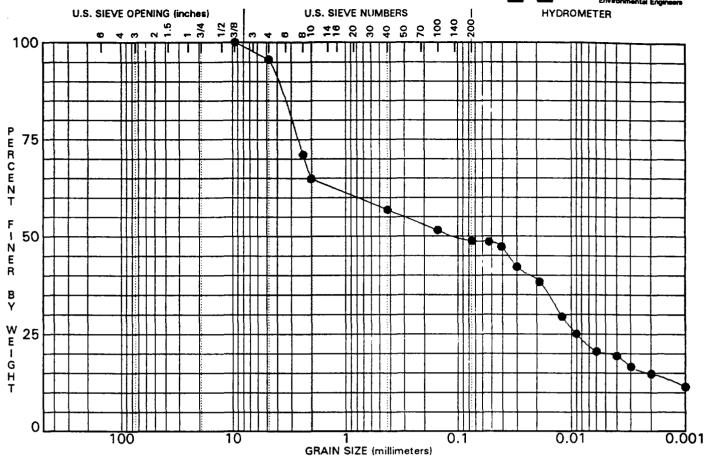
SAND

fine

medium

Client	Versar, Inc.	
Project	Envirochem Site	Prepared by
Location	Zionville, Indiana	Date 2/23/98
Project No.	990-62-01	(Pr. 7 Fax-2
		Checked by 01/07. 74172 Date 2/25/98





	OBBLES	GRA	.VEL		SAND			SILT or CLAY			
	coarse fine coarse medium							LAT			
		<u></u>									
Sample No./Depth		USCS Classification				MC%	LL	PL	PI	Сс	Cu

•	G-4-98	10.0	CLAYEY	SAND SC				29	21	9	
							-				
S	ample No./I	Depth	D100	D60	D30	D10	%Grave	1 %	Sand	%Silt	%Clay
P	G-4-98	10.0′	9.50	0.79	0.012		4.4	4	6.9	28.7	20.0
										····	
١		1		Ì							1

Client	Versar, Inc.	1//
Project	Envirochem Site	Prepared by YZ
Location	Zionville, Indiana	Date 3/4/58
Project No.	990-62-01	$\int_{\Omega} \int_{\Omega} dx dx = \int_{\Omega} \int_{\Omega} dx dx$
		Checked by COFILE 1. Faity
		Date 3/1/99

GRAVEL

fine

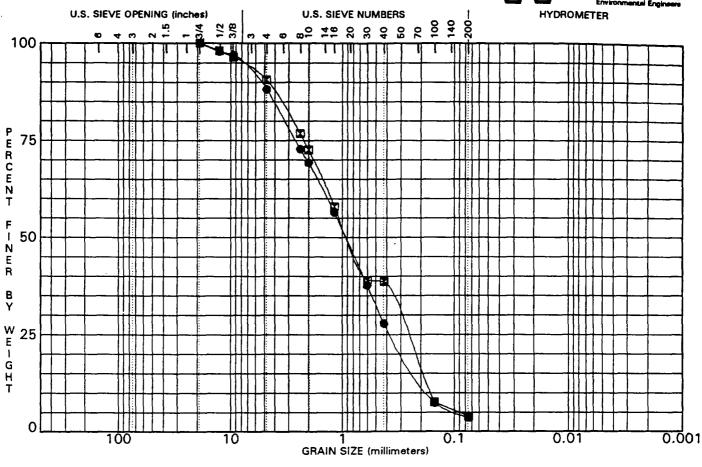
coarse

coarse

COBBLES



SILT or CLAY



98 24.0′	POORLY POORLY								0.90	7.8
		GRADED S	SAND SP						0.49	7.8
		,								
No./Depth	D100	D60	D30	D10	%Gravel	%San	nd	%Silt	%	Clay
-98 28.0	′ 19.00	1.37	0.459	0.1705	11.9	84.5	5		3 6	
98 24.0′	19.00	1.27	0.317	0.1620	9.5	86.5	5		40	
_										

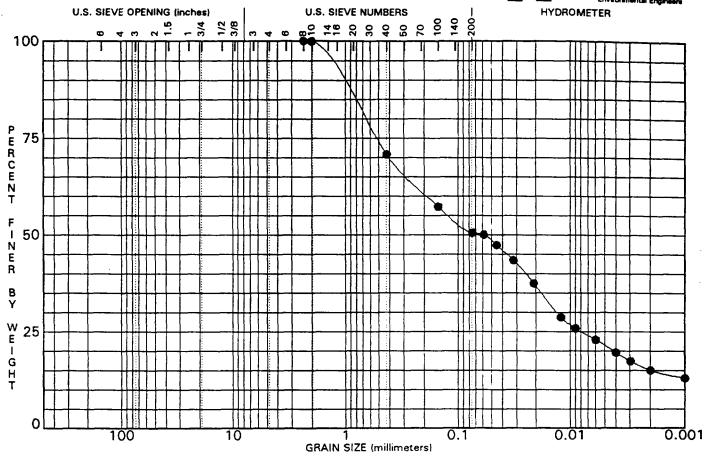
SAND

medium

fine

Client	Versar, Inc.	
Project	Envirochem Site	Prepared by
Location	Zionville, Indiana	Date 2/10/98
Project No.	990-62-01	
		Checked by Wolm 1- Fan 1
		Date 2/10/93

Wang Engineering, INC.
Consulting Geotechnical and
Environmental Engineers



COBBLES	GRA	VEL		SAND)	SILT or CLAY
COBBLES	coarse	fine	coarse	medium	fine	SIET OF CEAT

Sample No./Depth		USCS C	lassification		MC%	LL	PL	PI	Сс	Cu
G-15-98 12.0	SANDY S	SILTY CLA	Y CL-ML			17	12	5		ļ
	-									(0)
Sample No./Depth	D100	D60	D30	D10	%Gravel	%S	and	%Silt		6Clay
G-15-98 12.0	2.36	0.19	0.013		0.0	49	0.5	29.1		21.4
					 	 				
1 1										

Client	Versar, Inc.	
Project	Envirochem Site	Ρ
Location	Zionville, Indiana	
Project No.	990-62-01	
		_

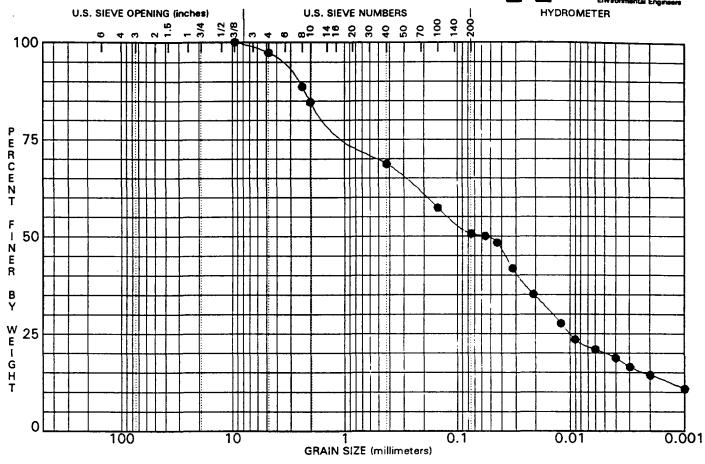
Prepared by YC

Date 3/4/98

Checked by Crow T. Far 1

Date 3/4/23

Wang Engineering, INC.
Consulting Geotechnical and
Environmental Engineers



COBBLES	GRA	VEL		SAND)	SILT or CLAY
COBBLES	coarse	fine	coarse	medium	fine	SILT OF CLAT

Sample No./Depth D100 D60 D30 D10 %Gravel %Sand %Silt %0	S	ample No./Depth		uscs c	lassification		MC%	LL	PL	PI	Сс	Cu
	•	G-16-98 10.0	'SANDY S	SILTY CLA	Y CL-ML			20	15	5		
• G-16-98 10.0' 9.50 0.19 0.014 2.7 46.7 30.7 19	s	ample No./Depth	D100	D60	D30	D10	%Gravel	%S	and	%Silt	9/	6Clay
	•	G-16-98 10.0	′ 9.50	0.19	0.014		2.7	46	5.7	30.7		19.9
]	1							

Client	Versar, Inc.
Project	Envirochem Site
Location	Zionville, Indiana
Project No.	990-62-01

Prepared by YC

Date 3/4/98

Checked by Corke 7. Fant 1

Date 3/5/98

_	990-62-01 e Envirochem	Boring No. Sample No.	G-4-98 202
Client	Versar, Inc.	Depth	8-10 Feet
Diameter	2.85 in	Proving Ring	21579
Height	4.675 in	Proving Ring Calibration Factor	2.1
Area	6.3761625 in ²	Moisture Content	23.9 %
Volume	0.01725032 ft ³	Unit Weight	120.6 pcf
Weight	2.08 lbs	Dry Unit Weight	97.3 pcf
		Specific Gravity	2.754
		Void Ratio	0.77

Degree of Saturation

86 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in²	(%)	psf
	0	0	0	0	0	0
	3	6.3	0.04675	6.44	1.0	141
	5	10.5	0.0935	6.51	2.0	232
	8	16.8	0.14025	6.57	3.0	368
	10	21	0.187	6.64	4.0	455
	12	25.2	0.23375	6.71	5.0	541
	13	27.3	0.2805	6.78	6.0	580
	13	27.3	0.32725	6.86	7.0	573
	14	29.4	0.374	6.93	8.0	611
	14	29.4	0.4675	7.08	10.0	598
	14	29.4	0.561	7.25	12.0	584
	14	29.4	0.6545	7.41	14.0	571

Project No.990-62-01Boring No.G-5-98Project NameEnvirochemSample No.111ClientVersar, Inc.Depth8-10 Feet

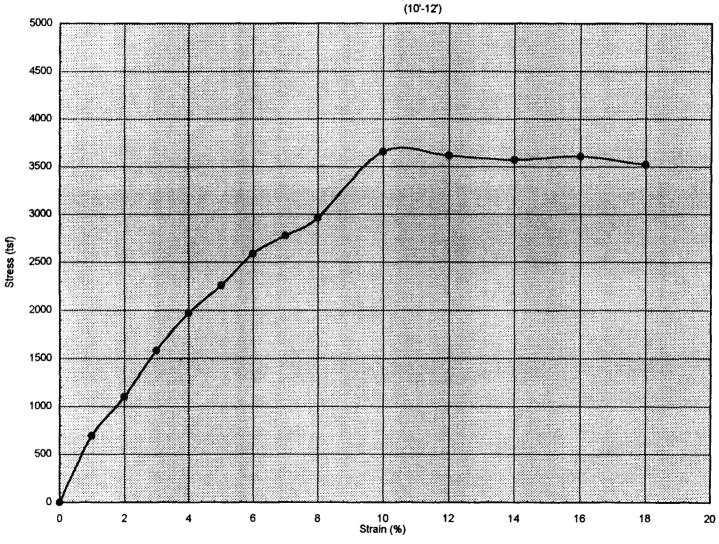
Diameter 2.877 in **Proving Ring** 21579 Height 2.1 6.08 in **Proving Ring Calibration Factor** 6.49754627 in² Area **Moisture Content** 9 % 0.02286174 ft³ 144.2 pcf Volume **Unit Weight** Weight 3.296 lbs Dry Unit Weight 132.3 pcf Specific Gravity 2.804 Void Ratio 0.32 Degree of Saturation 78 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in²	(%)	psf
	0	0	0	0	0	0
	44	92.4	0.0608	6.56	1.0	2027
	62	130.2	0.1216	6.63	2.0	2828
	73	153.3	0.1824	6.70	3.0	3296
	91	191.1	0.2432	6.77	4.0	4066
	104	218.4	0.304	6.84	5.0	4598
	114	239.4	0.3648	6.91	6.0	4987
	126	264.6	0.4256	6.99	7.0	5454
	133	279.3	0.4864	7.06	8.0	5695
	145	304.5	0.608	7.22	10.0	6074
	156	327.6	0.7296	7.38	12.0	6389
	159	333.9	0.8512	7.56	14.0	6364
	154	323.4	0.9728	7.74	16.0	6020
	154	323.4	1.0944	7.92	18.0	5877

Project No.	990-62-01	Boring No.	G-6-98
Project Nan	ne Envirochem	Sample No.	162
Client	Versar, Inc.	Depth	10'-12'
Diameter	2.873 in	Proving Ring	21579
Height	5.916 in	Proving Ring Calibration Factor	2.1
Area	6.47949127 in ²	Moisture Content	10.5 %
Volume	0.02218326 ft ³	Unit Weight	143.7 pcf
Weight	3.187 lbs	Dry Unit Weight	130.0 pcf
		Specific Gravity	2.669
		Void Ratio	0.28
		Degree of Saturation	100 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress	
	in 10E-04	PSF		in²	(%)	psf	
	0	0	0	0	0	0	
	15	31.5	0.05916	6.54	1.0	693	
	24	50.4	0.11832	6.61	2.0	1098	
	35	73.5	0.17748	6.68	3.0	1584	
	44	92.4	0.23664	6.75	4.0	1971	
	51	107.1	0.2958	6.82	5.0	2261	
	59	123.9	0.35496	6.89	6.0	2588	
	64	134.4	0.41412	6.97	7.0	2778	
	69	144.9	0.47328	7.04	8.0	2963	
	87	182.7	0.5916	7.20	10.0	3654	
	88	184.8	0.70992	7.36	12.0	3614	
	89	186.9	0.82824	7.53	14.0	3572	
	92	193.2	0.94656	7.71	16.0	3607	
	92	193.2	1.06488	7.90	· 18.0	3521	

STRESS - STRAIN CURVE Envirochem Site Boring G-6-98 S-16 (10'-12')

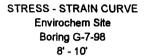


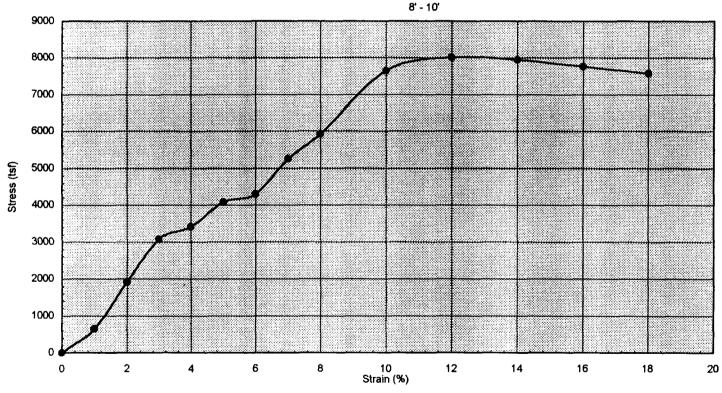
Project No. Project Nam	990-62-01 e Envirochem	Boring No. Sample No.	G-7-98 139
Client Versar, Inc.		Depth	8-10 Feet
Diameter	2.873 in	Proving Ring	21579
Height	6.077 in	Proving Ring Calibration Factor	2.1
Area	6.47949127 in ²	Moisture Content	8 %
Volume	0.02278696 ft ³	Unit Weight	143.7 pcf
Weight	3.274 lbs	Dry Unit Weight	133.0 pcf

3.274 lbs

Dry Unit Weight
Specific Gravity
2.692
Void Ratio
Degree of Saturation
82 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in²	(%)	psf
	0	0	0	0	0	0
	14	29.4	0.06077	6.54	1.0	647
	42	88.2	0.12154	6.61	2.0	1921
	68	142.8	0.18231	6.68	3.0	3078
	76	159.6	0.24308	6.75	4.0	3405
	92	193.2	0.30385	6.82	5.0	4079
	98	205.8	0.36462	6.89	6.0	4299
	121	254.1	0.42539	6.97	7.0	5252
	138	289.8	0.48616	7.04	8.0	5925
	182	382.2	0.6077	7.20	10.0	7645
	195	409.5	0.72924	7.36	12.0	8009
	198	415.8	0.85078	7.53	14.0	7947
	198	415.8	0.97232	7.71	16.0	7762
	198	415.8	1.09386	7.90	18.0	7577





Project No.	990-62-01	Boring No.	G-8-98
Project Name	Envirochem	Sample No.	210
Client	Versar, Inc.	Depth	8-10 Feet
Diameter	2.86 in	Proving Ring	21579
Height	5.836 in	Proving Ring Calibration Factor	2.1
Area	6.420986 in ²	Moisture Content	13.4 %
Volume	0.02168569 ft ³	Unit Weight	144.3 pcf

Specific Gravity 2.764 Void Ratio 0.36

127.3 pcf

Dry Unit Weight

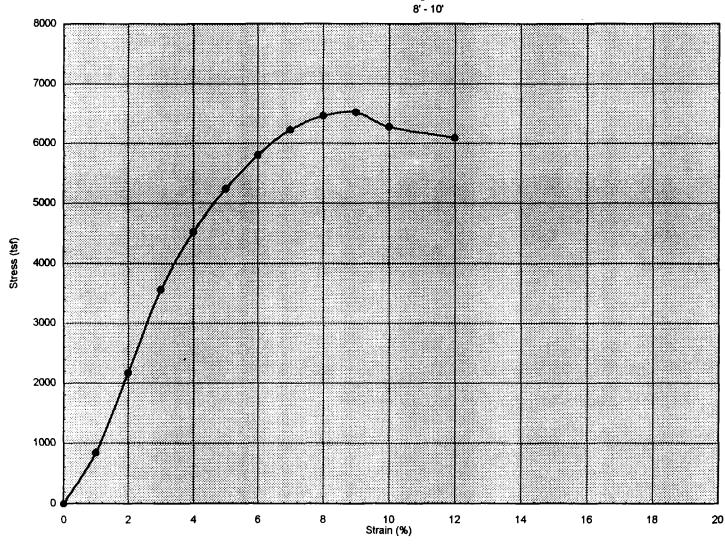
Degree of Saturation 100 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in²	(%)	psf
	0	0	0	0	0	0
	18	37.8	0.05836	6.49	1.0	839
	47	98.7	0.11672	6.55	2.0	2169
	78	163.8	0.17508	6.62	3.0	3563
	100	210	0.23344	6.69	4.0	4521
	117	245.7	0.2918	6.76	5.0	5235
	131	275.1	0.35016	6.83	6.0	5799
	142	298.2	0.40852	6.90	7.0	6219
	149	312.9	0.46688	6.98	8.0	6456
	152	319.2	0.52524	7.06	9.0	6514
	148	310.8	0.5836	7.13	10.0	6273
	147	308.7	0.70032	7.30	12.0	6092

Weight

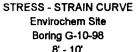
3.13 lbs

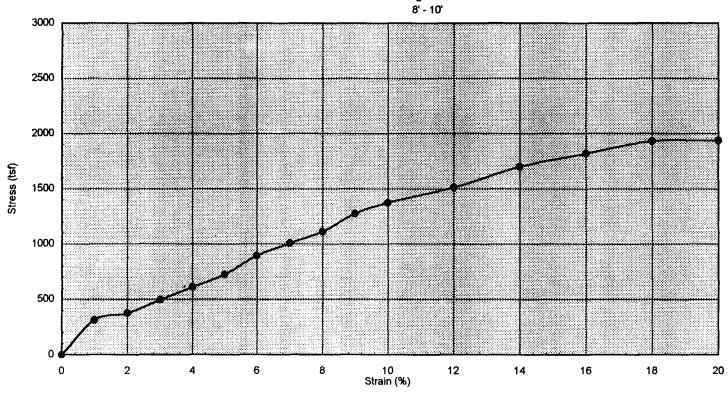
STRESS - STRAIN CURVE Envirochem Site Boring G-8-98



Project No.	990-62-01	Boring No.	G-10-98
Project Nam	e Envirochem	Sample No.	126
Client	Versar, Inc.	Depth	8-10 Feet
Diameter	2.461 in	Proving Ring	21579
Height	4.031 in	Proving Ring Calibration Factor	2.1
Area	4.75436899 in ²	Moisture Content	10.3 %
Volume	0.01109078 ft ³	Unit Weight	133.1 pcf
Weight	1.4764 lbs	Dry Unit Weight	120.7 pcf
	•	Specific Gravity	2.752
		Void Ratio	0.42
		Degree of Saturation	67 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in²	(%)	psf
	0	0	0	0	0	0
	5	10.5	0.04031	4.80	1.0	315
	6	12.6	0.08062	4.85	2.0	374
	8	16.8	0.12093	4.90	3.0	494
	10	21	0.16124	4.95	4.0	611
	12	25.2	0.20155	5.00	5.0	725
	15	31.5	0.24186	5.06	6.0	897
	17	35.7	0.28217	5.11	7.0	1006
	19	39.9	0.32248	5.17	8.0	1112
	22	46.2	0.36279	5.22	9.0	1273
	24	50.4	0.4031	5.28	10.0	1374
	27	56.7	0.48372	5.40	12.0	1511
	31	65.1	0.56434	5.53	14.0	1696
	34	71.4	0.64496	5.66	16.0	1817
	37	77.7	0.72558	5.80	18.0	1930
	38	79.8	0.8062	5.94	20.0	1934





Project No. Project Name	990-62-01 Envirochem				Boring No. Sample No.	G-11-98 44
Client	Versar, Inc.				Depth	10'-12'
Diameter	2.868 i	n			Proving Ring	8215
Height	5.791 in		Pr	oving Ring Calil	bration Factor	7.5
Area	6.45695784 i	n ²		-	sture Content	12 %
Volume	0.02163903 f	₹ ³			Unit Weight	145.1 pc
Weight	3.14	bs		Dr	y Unit Weight	129.6 pc
-	•			Sp	pecific Gravity	2.699
					Void Ratio	0.30
				Degree	of Saturation	100 %
Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in²	(%)	psf
	0	0	0	0	0	0
	14	105	0.05791	6.52	1.0	2318
	18	135	0.11582	6.59	2.0	2950
	20	150	0.17373	6.66	3.0	3245
	24	180	0.23164	6.73	4.0	3854
	26	195	0.28955	6.80	5.0	4131
	29	217.5	0.34746	6.87	6.0	4560
	31	232.5	0.40537	6.94	7.0	4822
	32	240	0.46328	7.02	8.0	4924
	33	247.5	0.52119	7.10	9.0	5023
	34	255	0.5791	7.17	10.0	5118
	37	277.5	0.69492	7.34	12.0	5446
	39	292.5	0.81074	7.51	14.0	5610
	38	285	0.92656	7.69	16.0	5339

1.04238

7.87

18.0

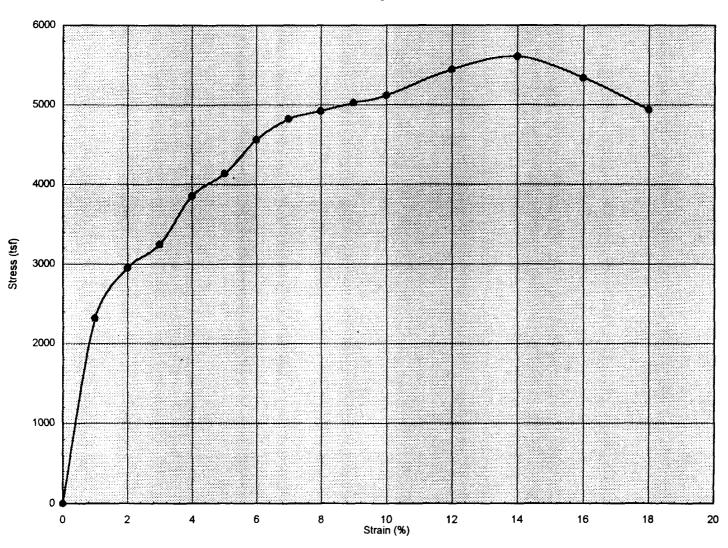
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Unconfined Compressive Strength ASTM D 2199-91

STRESS - STRAIN CURVE Envirochem Site Boring G-11-98 S-44 (10'-12')



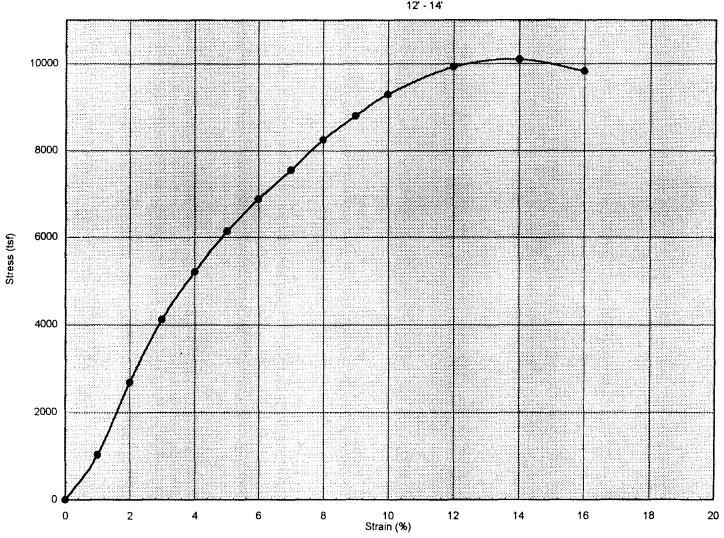
Project No. 990-62-01
Project Name Envirochem
Client Versar, Inc.

Boring No. G-14-98
Sample No. 241
Depth 12-14 Feet

Diameter 2.857 in Proving Ring 21579 Height 6.018 in **Proving Ring Calibration Factor** 2.1 Area 6.40752247 in² **Moisture Content** 8.4 % Volume 0.02231509 ft³ Unit Weight 140.3 psf Weight 3.13 lbs Dry Unit Weight 129.4 psf Specific Gravity 2.709 Void Ratio 0.31 74 % Degree of Saturation

Total Strain Corrected Area Unit Strain Stress Elapse Time Load Dial Axial Load in² in 10E-04 **PSF** (%) psf 0 0 0 0 0 0 22 46.2 0.06018 6.47 1.0 1028 58 121.8 0.12036 6.54 2.0 2683 90 189 0.18054 6.61 3.0 4120 115 241.5 0.24072 6.67 4.0 5210 0.3009 6.74 5.0 6142 137 287.7 325.5 0.36108 6.82 6.0 6876 155 7.0 172 361.2 0.42126 6.89 7549 399 6.96 8.0 8250 190 0.48144 205 430.5 0.54162 7.04 9.0 8804 7.12 10.0 9302 219 459.9 0.6018 7.28 12.0 9926 239 501.9 0.72216 249 522.9 0.84252 7.45 14.0 10106 248 520.8 0.96288 7.63 16.0 9832

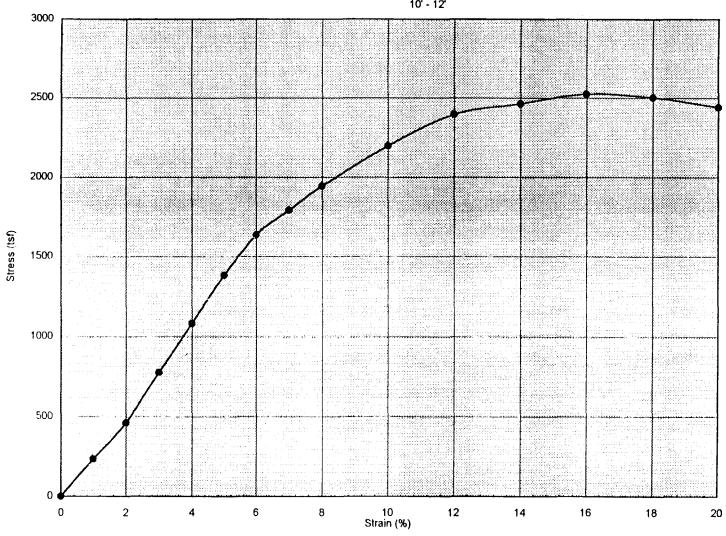
STRESS - STRAIN CURVE Envirochem Site Boring G-14-98 12' - 14'



Project No.	990-62-01	Boring No.	G-15-98
Project Name	Envirochem	Sample No.	248
Client	Versar, Inc.	Depth	10-12 Feet
Diameter	2.865 in	Proving Ring	21579
Height	5.983 in	Proving Ring Calibration Factor	2.1
Area	6.44345663 in ²	Moisture Content	11.8 %
Volume	0.02230972 ft ³	Unit Weight	144.8 psf
Weight	3.23 lbs	Dry Unit Weight	129.5 psf
		Specific Gravity	2.727
		Void Ratio	0.31
		Degree of Saturation	100 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in ²	(%)	psf
	0	0	0	0	0	0
	5	10.5	0.05983	6.51	1.0	232
	10	21	0.11966	6.57	2.0	460
	17	35.7	0.17949	6.64	3.0	774
	24	50.4	0.23932	6.71	4.0	1081
	31	65.1	0.29915	6.78	5.0	1382
	37	77.7	0.35898	6.85	6.0	1632
	41	86.1	0.41881	6.93	7.0	1789
	45	94.5	0.47864	7.00	8.0	1943
	52	109.2	0.5983	7.16	10.0	2196
	58	121.8	0.71796	7.32	12.0	2395
	61	128.1	0.83762	7.49	14.0	2462
	64	134.4	0.95728	7.67	16.0	2523
	65	136.5	1.07694	7.86	18.0	2501
	65	136.5	1.1966	8.05	20.0	2440

STRESS - STRAIN CURVE Envirochem Site Boring G-15-98 10' - 12'



Project No. 990-62-01
Project Name Envirochem
Client Versar, Inc.

Boring No. G-16-98 Sample No. 256

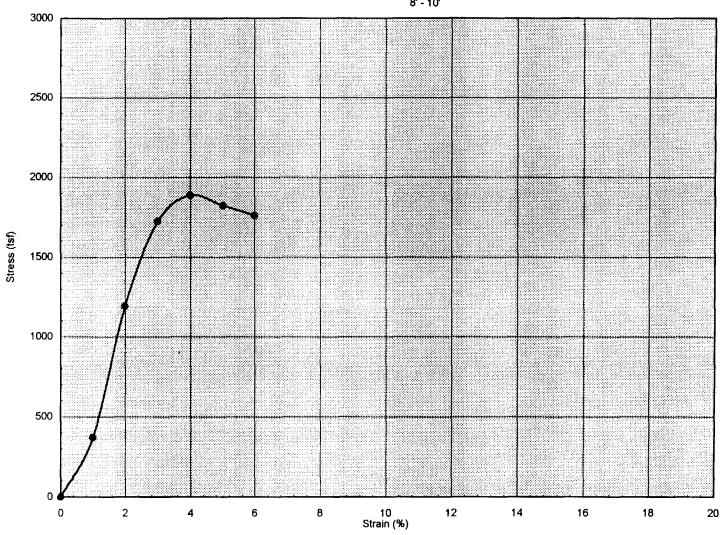
Depth

8-10 Feet

Diameter	2.869 in	Proving Ring	21579
Height	5.519 in	Proving Ring Calibration Factor	2.1
Area	6.46146139 in ²	Moisture Content	12.3 %
Volume	0.02063704 ft ³	Unit Weight	139.9 pcf
Weight	2.888 lbs	Dry Unit Weight	124.6 pcf
•		Specific Gravity	2.632
		Void Ratio	0.32
		Degree of Saturation	100 %

Elapse Time	Load Dial	Axial Load	Total Strain	Corrected Area	Unit Strain	Stress
	in 10E-04	PSF		in²	(%)	psf
	0	0	0	0	0	0
	8	16.8	0.05519	6.53	1.0	371
	26	54.6	0.11038	6.59	2.0	1192
	38	79.8	0.16557	6.66	3.0	1725
	42	88.2	0.22076	6.73	4.0	1887
	41	86.1	0.27595	6.80	5.0	1823
	40	84	0.33114	6.87	6.0	1760

STRESS - STRAIN CURVE Envirochem Site Boring G-16-98 8' - 10'



APPENDIX D DEWATERING PUMP RATE ESTIMATES BY RADIAN

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RADIAN CORP.-PITTSBURGH

Enviro_d.tdo

TWODAN version 5.0. Thursday, November 20, 1997 6:44:22 AM

Aquifer input data:

Base elevation: 855.500

Hydraulic conductivity of lower layer : 28.3000

Thickness of lower layer: 14.5000

Hydraulic conductivity of upper layer : .283000E-01

Thickness of upper layer: .000000

Minimum sat. thick. for solve calculations.: .706714E-01

Reference head input data:

Specified head: 881.000

x coordinate of reference point: .000000 Y coordinate of reference point: 1000.00

Uniform crossflow data:

Uniform aquifer discharge rate: .861700

Angle of uniform flow direction from x axis: .000000

Well input data (steady-state wells): Total number of steady wells: 10

Head-specified wells:

Column 1: well number

Column 2: x coordinate of well

Column 3: y coordinate of well

Column 4: radius of well

Column 5: discharge of well

Column 6: x coordinate of well reference point

Column 7: y coordinate of well reference point Column 8: head specified at well reference point 1100.00 1100.00 1000.00 .166700 1125.78 1 1000.00 868.000 1205.00 1000.00 .166700 701,811 1205.00 1000.00 868.000 1310.00 1000.00 .166700 998.123 1310.00 1000.00 868.000 1100.00 1080.00 .166700 1100.00 1125.78 1080.00 868.000 1080.00 1205.00 .166700 701.811 1205.00 1080.00 868.000 1310.00 1080.00 .166700 998.123 1310.00 1080.00 868.000 1150.00 1080.00 .166700 798.063 1150.00 1080.00 868.000 1150.00 1000.00 798.063 1150.00 .166700 1000.00 868.000 9 1260.00 1080.00 .166700 746.033 1260.00 1080.00 868.000 1260.00 10 1260.00 1000.00 .166700 746.033 1000.00 868.000

The following sections check if the solution met specified boundary conditions at time = .000000

Enviro_d.tdo

Reference point boundary condition:

Specified head at reference point: 881.000

Model-calculated head at reference point: 881.000

Head-specified well boundary conditions:

Column 1: well number

Column 2: head specified at well reference point

Column 3: model-calculated head at well reference point

1	868.000	868.000
2	868.000	868.000
3	868.000	868.000
4	868.000	868.000
5	868.000	868.000
6	868.000	868.000
7	868.000	868.000
8	868.000	868.000
9	868.000	868.000
10	868.000	868.000

Enviro_d2.tdo

TWODAN version 5.0. Thursday, November 20, 1997 8:08:10 AM

Aquifer input data:

Base elevation: 855.500

Hydraulic conductivity of lower layer :

Thickness of lower layer: 14.5000

Hydraulic conductivity of upper layer : .283000E-01

Thickness of upper layer: .000000

Minimum sat. thick. for solve calculations.: .706714E-01

Reference head input data:

Specified head: 881.000

x coordinate of reference point: .000000 Y coordinate of reference point: 1000.00

Uniform crossflow data:

Uniform aquifer discharge rate: .861700

Angle of uniform flow direction from x axis: .000000

Well input data (steady-state wells): Total number of steady wells: 10

Head-specified wells:

Column 1: well number

Column 2: x coordinate of well

Column 3: y coordinate of well

Column 4: radius of well

Column 5: discharge of well

Column 6: x coordinate of well reference point Column 7: y coordinate of well reference point

Column		ified at well			
1		1000.00	.166700	879.899	1100.00
	868.000				
	1205.00	1000.00	.166700	529.615	1205.00
_	868.000		4.5.60.00	500 050	1210 00
-	1310.00	1000.00	.166700	733.053	1310.00
	868.000	4.004 0.0	4.66550	B45 030	4400 00
-	1100.00	1080.00	.166700	717.932	1100.00
	868.000	1000 00	166700	354.439	1205.00
_	1205.00 868.000	1080.00	.166700	334.439	1205.00
	1310.00	1080.00	.166700	552.636	1310.00
_	868.000	1000.00	.100700	352.030	1310.00
	1150.00	1080.00	.166700	448.082	1150.00
	868.000	2000.00	.100/00	2401002	1130.00
	1150.00	1000.00	.166700	614.024	1150.00
	868.000	2000.00	. 200, 00	0211021	
	1260.00	1080.00	.166700	378.726	1260.00
1080.00	868,000				
	1260.00	1000.00	.166700	554.068	1260.00
1000.00	868.000				

Data for impermeable/resistant boundary number 1

Type of boundary: resistant Shape of boundary: open

Enviro_d2.tdo

```
Number of corners on boundary:
  Thickness/Conductivity (not used for imperm.):
                                                        714.000
  Boundary data:
    Column 1: corner number
    Column 2: x coordinate of corner point
    Column 3: y coordinate of corner point
    Column 4: Head on + side of boundary (ave. of 2 control points)
Column 5: Head on - side of boundary (ave. of 2 control points)
                                         907.500
             109.181
                           1200.00
                                                        903.500
       1
       2
             605.459
                           1205.00
                                          881.116
                                                        876.156
       3
             1210.92
                           1205.00
                                          880.274
                                                        870.466
       4
             1940.45
                           1210.00
                                          907.500
                                                        903.500
The following sections check if the solution met
specified boundary conditions at time = .000000
Reference point boundary condition:
  Specified head at reference point:
                                           881.000
  Model-calculated head at reference point:
                                                   B81.000
Head-specified well boundary conditions:
  Column 1: well number
  Column 2: head specified at well reference point
  Column 3: model-calculated head at well reference point
       1
            868.000
                          868.000
       2
            868.000
                          868.000
            868.000
                          868,000
       3
       4
            868.000
                          868.000
                          868.000
       5
            868.000
       6
            868.000
                          868.000
       7
            868.000
                          868.000
                           868.000
       Я
            868.000
       9
            868.000
                           868,000
```

Boundary conditions, imperm./resist. boundary number 1
Type of boundary: Resistant

868.000

Column 1: Corner number

868.000

10

Column 2: Model-calculated discharge Qn across boundary (average of Qn at two control points associated with this corner)

Column 3: Qn* across boundary calculated from head drop and the resistance (resistant boundary only) (average of Qn* at two control points associated with this corner)

Column 4: Ratio of columns 3/2 (resistant boundary only)

2 .100671 .100733 1.00061 3 .199021 .199169 1.00074

(see attached output for data used in model) Pumping with no slurry wall Total Q=45 gpm

(0, X, 0)

871.50

873.00

OF ETS

.00.578

05.718 817.50

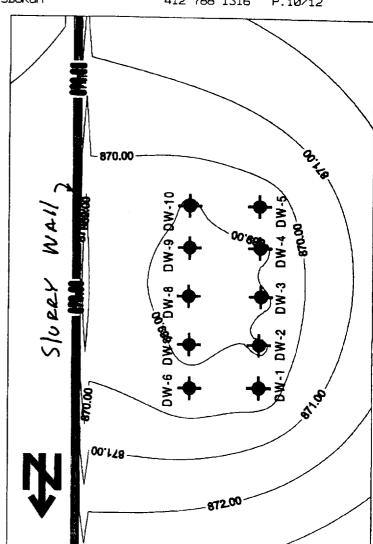
-871.00

OF DEWICE

872.00

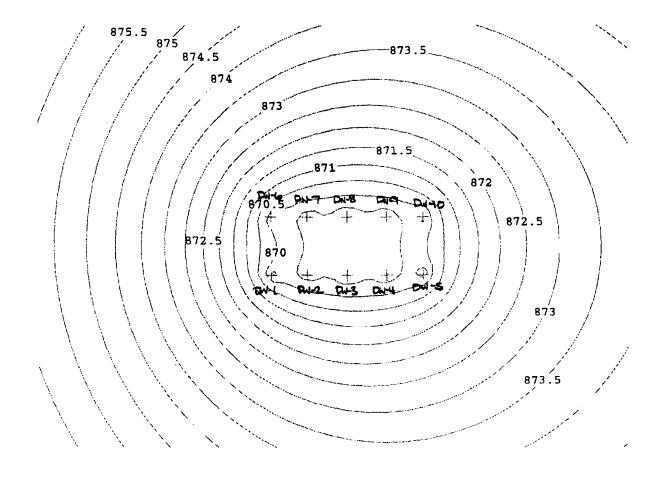


872.00



(see attached output for data used in model) Pumping with slurry wall Total Q=30 gpm

<u> N</u>

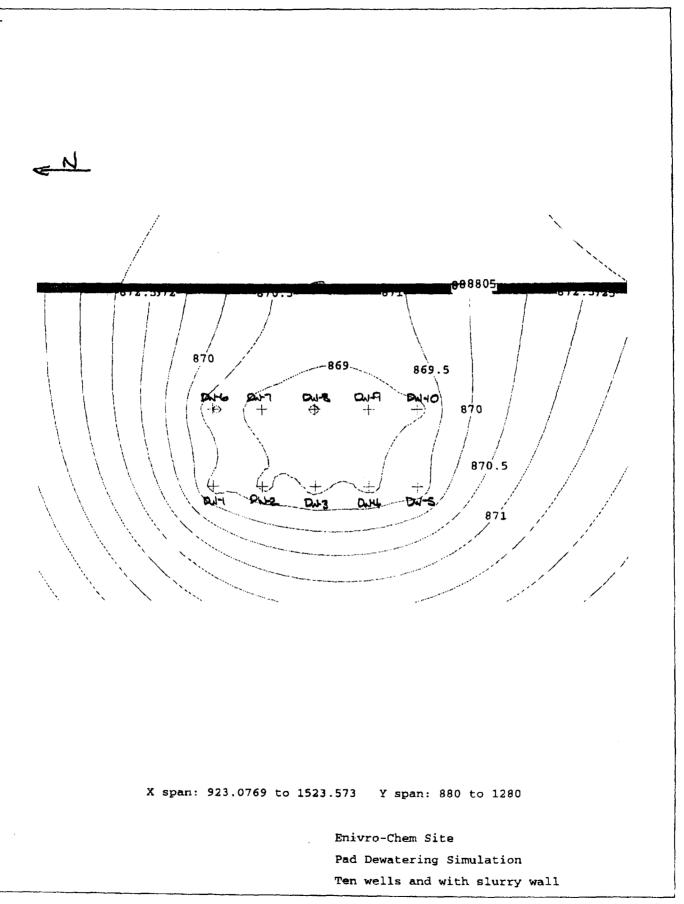


X span: 784.119 to 1588.089 Y span: 760 to 1345

Enivro-Chem Site

Pad Dewatering Simulation

Ten wells and no slurry wall



Appendix E Preliminary Hot Spot Report Preliminary Hot Spot Report Enviro-Chem Superfund Site Zionsville, Indiana

April 8, 1998



Table of Contents

Introduction	
Background	
Field Investig	ation1
Localized Geo	ology2
Localized Hyd	drogeology3
Concentrated	Organics Distribution
Remedial Pro	gram4
Figures	
Figure 1	Hot Spot Site Map
Figure 2	Hot Spot Geologic Cross Section
Appendix	
Appendix A	Drilling Logs

Introduction

This report presents the preliminary results of the hot spot treatment investigation at the Enviro-Chem Site located in Zionsville, Indiana. As part of this treatment investigation, five soil borings were advanced in the southwest corner of the Southern Concrete Pad Area; wells were installed in two of the borings; groundwater samples were collected for CLP analyses (full priority pollutant list) from the two wells; and a sample was collected for a pilot study for the recommended remediation (Fenton reagent/in-situ oxidation), see Versar's Hot Spot Work Plan dated 9 March.

This report focuses on only the geology of the hot spot area and the extent of the concentrated organics in relation to the geology. The information is presented graphically on Figures 1 and 2. A final report will be submitted once the results of the pilot test and the ground water sample analyses are received.

Background

During the advancement of the Southern Concrete Pad Geotechnical Survey's borings (G-1 through G-18) at the Enviro-Chem site, unexpected concentrated organics were encountered below six feet in soil borings G-17 and G-18. Based on these borings, the extent of the concentrated organics appeared to be limited and subsurface characteristics suggested that a Fenton reagent would be an appropriate method of treatment for the hot spots. Versar developed a work plan (dated March 1998) to address the hot spots.

Field Investigation

An initial soil exploration boring, designated as TB-1 (Test Boring -1), was advanced at the location shown on Figure 1. Originally, this boring was to be advanced in an uncontaminated area north of G-18, however, due to significant water and ice on the concrete pad at the time of drilling, the location was changed to a dry and uncontaminated area east of G-18 as shown on Figure 1. The purpose of this boring was to characterize the underlying stratigraphy proximate to the "hot spot."

In addition, based on the anticipated extent of concentrated organics in the hot spots (determined during the Southern Concrete Pad Geotechnical Survey), four boreholes were advanced in the area of the hot spot and were designated as IW-1 through IW-4 (Injection Well) at the locations shown on Figure 1. The purpose of these boreholes was to intercept the zone of concentrated organics (based on PID measurements and visual observations) and to install well screens in the appropriate interval to allow withdrawal of groundwater and subsequent injection of chemical oxidants for treatment purposes. Water bearing sand units with associated concentrated organics were encountered in boreholes IW-1 and IW-4 only. No significant water or concentrated organics were encountered in boreholes IW-2 and IW-3, and as a result, these two boreholes were grouted to the

surface in accordance to Indiana Department of Environmental Management (IDEM) guidelines. Four-inch diameter wells were installed in boreholes IW-1 and IW-4.

Prior to advancing the five boreholes, a 12-inch diameter casing was installed to a depth of six feet below the ground surface to prevent potential cross-contamination from the upper five feet of contaminated soils (identified by previous evaluations). Hollow stem auger drilling methodologies were utilized coupled with continuous split spoon sampling in each of drilling locations. All split-spoon samples were logged geologically and field screened for volatile organic vapors using an HNu Photo-Ionization Detector calibrated to an isobutylene standard. Four-inch diameter PVC casing and well screen (0.020 slot size) with a bottom cap were installed in boreholes IW-1 and IW-4. A sand pack was added to approximately one foot above the screened interval. A two-foot bentonite seal was placed on top of the sand pack, and the remaining annular space was grouted with a cement and bentonite slurry. The wells were completed with concrete base, protective casing, and locking caps. Drill cuttings were containerized in 55-gallon drums and stored on-site for subsequent incorporation into the SVE treatment area.

The two newly installed monitoring wells were developed utilizing air sparging equipment (30 to 40 pounds per square inch of pressure) and hand bailing. Well IW-1 was bailed dry and did not have any significant recovery over a period of five hours. However, after three days, the water level was approximately 10 feet below the ground surface. Well IW-4 was bailed dry (after approximately three well volumes had been removed). After two hours, the water level appeared to stabilize at 18.5 feet below the ground surface. Purge water was containerized in 55-gallon drums and stored on-site for subsequent treatment in the on-site WWT system prior to discharge.

During the boring program, attention was focused on the moisture content in each of the samples, the specific soil classification of the sample, the static water level in the borehole, any changes in water level, and evidence of concentrated organics. Drilling logs are presented in Appendix A (graphic logs and well construction details will be completed and provided in the final report).

Localized Geology

The stratigraphy underlying the hot spot is that of glacial deposition based on the erratic distribution of sediments, poorly sorted sands and gravels, and the intermixing of angular and well rounded surfaces on the gravel surfaces. A geologic cross section (Figure 2) has been prepared based on the geotechnical evaluation and hot spot evaluation soil borings. Four distinct lithological material types were encountered in the hot spot area as follows:

1) Disturbed Grey and Brown Clay/Silt

The upper 5 to 12 feet consisted of grey and brown clay, silt, fine to coarse sand, and gravel. The material ranged from moist to wet and was heavily mottled in areas. The material had a chemical

odor in some areas. Several of the split-spoon samples had evidence of wooden plant debris, which appeared to be relatively recent in age (not of glacial age), suggesting that this zone of material may not be naturally in-place (i.e. disturbed, excavated and re-compacted, etc.). This zone appeared to be excessively thick in the extreme southwestern corner of the concrete pad (borings IW-2 and G-17).

2) Grey Clay and Silt

This material is interbedded with the brown sand and gravel material (discussed below). Generally, this material is dry to damp, rarely wet, and was never saturated when encountered, suggesting that it acts as a relatively impermeable layer. It was often encountered with trace amounts of well rounded to angular, fine to coarse sand and gravel indicative of glacial deposition.

3) Brown Sand and Gravel

This material was interbedded with the grey clay and silt material (discussed above). This material consisted of a brown fine to medium, well rounded to angular sand and gravel. Generally the lenses that were encountered were not continuous and pinched in and out. The lenses were all saturated and appeared to be the migration pathways for the concentrated organics. It should be noted that in many of the borings the sand and gravel layers contained concentrated organics and the grey clay layers above and below the sand and gravel were clean (based on PID readings).

4) Brown Gravel

This material was encountered only in boring IW-3. Based on the borings conducted during the Southern Concrete Pad Geotechnical Survey, this gravel layer was typically encountered at a depth of 15 to 23 feet below the ground surface. It is apparent that this layer is not continuous under portions of the hot spot area since it was not encountered in boring TB-1 (total depth 40 feet). Generally, this gravel layer consists of brown fine to coarse, poorly sorted, well rounded to angular gravel which is saturated. Some fine to coarse sand was also encountered in this material, but the majority of the material was gravel. It is presumed that this is similar to the material that has been referred to as the "lower" or "deep" sand unit in previous reports.

Localized Hydrogeology

It was evident during the hot spot boring program that only the sand and gravel layers were saturated. The clay zones were dry to damp, suggesting that the sand and gravel layers appear as the only water bearing zones, while the clay zones act as confining layers. The most significant hot spots (based on PID measurements) were identified in the saturated sand and gravel zones.

The two wells that were installed (IW-1 and IW-4) were developed utilizing air sparging equipment (30 to 40 pounds per square inch of pressure) and hand bailing. The wells were left to stabilize for three days after the development process. The water in IW-1 stabilized at 10.0 feet below the ground surface, and IW-4 stabilized at 18.5 feet below the ground surface (see Figure 2). It is apparent that the sand layers drained into IW-1 because the top of the saturated sand lens encountered (screened) in IW-1 was approximately 10 feet below the ground surface. The screened sand layer in IW-4 was first encountered at approximately 18 feet below the ground surface, suggesting that the water level in this well is also a result of drainage from the intercepted saturated sand lens (see Figure 2).

Additional water levels will be recorded to further evaluate hydrogeologic characteristics, however, based on the data available to date, no evidence of artesian conditions have been encountered in the hot spot area. It should also be noted that no water table conditions have been identified to date; only perched water bearing zones were encountered.

Concentrated Organics Distribution

The majority of the concentrated organics material (based on PID measurements presented in Figure 2) in the hot spot area was encountered in the saturated, interbedded sand and gravel layers between 9 and 22 feet below the ground surface.¹ The source of these concentrated organics is not clear, however, the concentrated organics appears to be confined to the sand and gravel lenses. The sand and gravel units are not continuous, and as a result, the concentrated organics are not wide spread, but rather appear to be confined to the extent of the sand and gravel units. Figure 1 presents the interpreted lateral extent of the hot spots. It should be noted that the southern edge of the hot spots has not been clearly defined.

Based on visual observations and odors, two distinct and likely disconnected hot spots were identified:

- an upper hot spot located in a possibly interconnected sand and gravel zone between
 9 and 16 feet below the ground surface, which had a strong chlorinated solvent odor;
 and
- a lower hot spot located between 17 and 21 feet below the ground surface, which had a very different odor (semi-volatile type compound) and appearance (brown oily compound).

¹ Concentrated organics were identified in the geotechnical boring G-18 below this depth, however, it is believed that this material may have been dragged down as a result of the drilling methodology that was utilized. The concentrated organics may still exist at the depth identified in G-18 (see Figure 2), and as a result, the well screen in IW-4 was extended to intercept this depth.

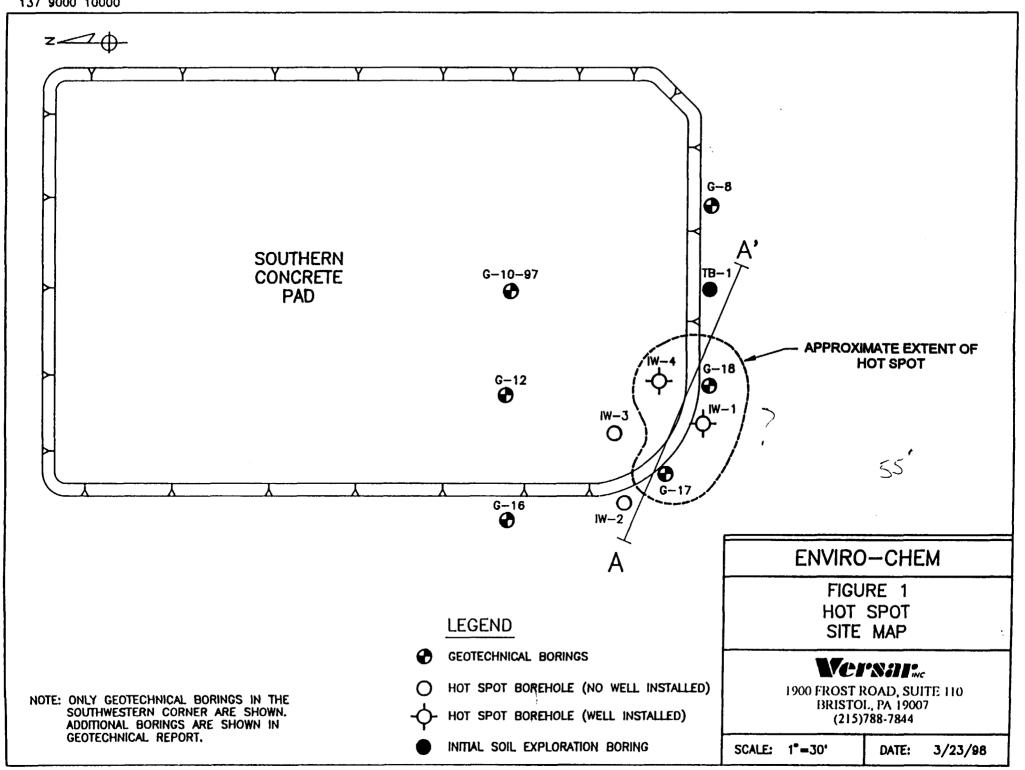
The grey clay layers which separate these hot spots appear to be clean (based on PID measurements), suggesting that the concentrated organics have been confined to the sand and gravel layers.

not exactly tive

Remedial Program

Injection wells (IW-1 and IW-4) have been installed with screen depths that intercept the hot spot zones. IW-1 has been constructed to treat the upper hot spot (chlorinated solvents), and IW-4 has been constructed to treat the lower hot spot (semi-volatile type compound). Based on development information, the injection wells are well connected to the formation allowing appropriate withdrawal of concentrated organics and subsequent injection of the Fenton reagent. The original calculation identifying the amount of concentrated organics requiring treatment has been significantly reduced based on the extent of the hot spots identified.

FIGURES



APPENDIX A DRILLING LOGS

PROJECT ENVIRO-CHEM		OWNER	********	SKETCH MAP		
LOCATION ZIONSVILLE, IN		W.O. NUMBER	3 2495-1010	ND - NOT DETECTED		
BORING NUMBER TB-1 TOTAL DEP		TH 40' DIAMETER 6"		VPPM - VAPOR PARTS PER MILLION		
SURFACE ELEV WAT LEV: I		VIT	24-HRS	SS - SPLIT SPOON		
SCREEN: DIA	LENGTH -	SLOT SIZE		F - FINE M - MEDIUM		
CASING: DIA LENGTH		TYPE				
DRILLING COMPANY TOP FLIGHT		DRITILLING METHOD HSA		C - COARSE		
DRILLER NICK LOG BY VE		8	DATE DRILLED 3-12-98	NOTES		

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
1						0-8.0 GREY AND BROWN CLAY, LITTLE TO TRACE
2						SILT, TRACE FINE TO COARSE SAND, WET,
3					50	DISTURBED, STRONG PESTICIDE ODOR
4						8.0-10.0 GREY CLAY, TRACE SILT,
5						TRACE F-C SAND, DAMP,
_ 6			SS-1	7-5	6.2	NO ODOR
7				13-17		
. 8			SS-2	5-11	2.3	
9				15-14	<u> </u>	10.0-10.2 BROWN COARSE SAND, POORLY
10			SS-3	8-8	ND	SORTED, SATURATED, NO ODOR
11]			10-12		10.2-22.5 GREY CLAY, SOME SILT, TRACE
12	j		SS-4	6-7	ND	F-C GRAVEL (WELL ROUNDED),
13				8-9		DAMP, NO ODOR
14			SS-5	4-4	ND	
15				7-10		
16			SS6	5-8	ND	
17				10-10		
18			SS-7	5-6	ND	
19				6-10		
20			SS-8	5-5	ND	
21				8-11		22.5-22.7 BROWN, WELL SORTED
22			SS-9	10-13		F-M SAND SATURATED
23	7			16-23	1.7	

DRILL LOG -TB 1 (continued)

PROJECT ENVIRO-CHEM		OWNER -		SKETCH MAP		
LOCATION ZIONSVILLE, IN		W.O. NUMBER 2495-1010		ND - NOT DETECTED		
BORING NUMBER TB-1 TOTAL DEP		TH 40' DIAMETER 6"		VPPM - VAPOR PARTS PER MILLION		
SURFACE ELEV WAT LEV: I		NIT 24-HRS		SS - SPLIT SPOON		
SCREEN: DIA LENGTH -		SLOT SIZE		F - FINE M - MEDIUM		
CASING: DIA LENGTH		TYPE		C - COARSE		
DRILLING COMPANY TOP FLIGHT		DRITILLING METHOD HSA				
DRILLER NICK LOG BY VFB		-B	DATE DRILLED 3-12-98	NOTES		

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
24			SS.10	7-14	ND	22.7-32.5 GREY CLAY, SOME SILT,
25				17-33		LITTLE FINE GRAVEL (ANGULAR)
26			SS-11	18-31	ND	GRADATION INTO MORE SILT CONTENT
27				38-50		WITH DEPTH, DRY, NO ODOR
28			SS-12_	16-21	ND	
29	<u> </u>		<u> </u>	31-45		
30]		SS-13_	22-38	ND	
31]			50		
32	1		SS-14	42-50	ND	32.5-32.7 BROWN, WELL SORTED
33						MEDIUM SAND, SATURATED,
34			SS-15	50 (5")	ND	NO ODOR
35						
36			SS-16	37-50	ND	32.7-40.0 GREY CLAY, TRACE SILT
37]			(5")		TRACE F-C
38]		SS-17	42-50	ND	ANGULAR/WELL ROUNDED
39				(6")		GRAVEL, DAMP, NO ODOR
40	_					
	_					

PROJECT ENVIRO-CHEM		OWNER		SKETCH MAP
LOCATION ZIONSVILLE, IN		W.O. NUMBER 2495-1010		ND - NOT DETECTED
BORING NUMBER IW-1 TOTAL DEPT		TH 22.0' DIAMETER 8.0'		VPPM - VAPOR PARTS PER MILLION
SURFACE ELEV WAT LEV: II		NIT	24-HRS	SS - SPLIT SPOON F - FINE M - MEDIUM
SCREEN: DIA 4"	SCREEN: DIA 4" LENGTH 5		SLOT SIZE .020	C - COARSE
CASING: DIA 4"	CASING: DIA 4" LENGTH		TYPE PVC	
DRILLING COMPANY TOP	LIGHT	DRITILLING METHOD HSA		
DRILLER NICK LOG BY VE		FB	DATE DRILLED 3-12-98	NOTES

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
1						0.610 GREY AND BROWN CLAY,
2						LITTLE SILT, TRACE FINE
3					80	TO COARSE SAND, WET,
4						DISTURBED, ODOR PRESENT
5						
6			SS-18	8-15	54	6.0-9.8 GREY CLAY, SOME SILT, TRACE
7		ļ		17-32		F-M SAND, TRACE F-M
8			SS-19	9-10	12.5	GRAVEL (WELL ROUNDED), DAMP,
9		ļ		13-22		MOTTLED, SLIGHT ODOR
10	<u> </u>		SS-20	5-5	20.4	9.8-10.0 BROWN F-M GRAVEL, SATURATED,
11				7-12		SLIGHT ODOR (CHLORINATED SOLVENT)
12			SS-21	3-5	3.0	10.0-12.0 GREY CLAY, SOME SILT,
13				12-23		MOIST, NO ODOR
14			SS-22	6-8	114.7	12.0-12.2 BROWN FINE TO MEDIUM
15				11-12	ND	SAND AND GRAVEL, SATURATED,
16			SS-23	3-4	ND	ODOR (CHLORINATED SOLVENT)
17				7-10		12.2-14.0 GREY CLAY, LITTLE SILT,
18	_		SS-24	4-5	ND	DAMP, NO COOR
19				7-9		14.0-14.8 BROWN COARSE SAND, STRONG ODOR
20			SS-25	4-6	NO	(CHLORINATED SOLVENT)
21	_			9-9		14.8-19.5 GREY CLAY, LITTLE SILT,
22						DAMP. NO ODOR
						19.5-19.6 BROWN FINE SAND, SATURATED, NO ODOR
	<u> </u>					19.6-22.0 GREY CLAY, TRACE SILT, DAMP, NO ODOR

PROJECT ENVIRO-CHEM		OWNER		SKETCH MAP		
LOCATION ZIONSVILLE, IN	I	W.O. NUMBER 2495-1010		ND - NOT DETECTED		
BORING NUMBER IW-2 TOTAL DEP		TH 20.5 DIAMETER 8.0"		VPPM - VAPOR PARTS PER MILLION		
SURFACE ELEV WAT LEV: I		NIT 24-HRS		SS - SPLIT SPOON		
SCREEN: DIA LENGTH -		SLOT SIZE		F - FINE M - MEDIUM		
CASING: DIA LENGTH		TYPE		C - COARSE		
DRILLING COMPANY TOP FLIGHT		DRITILLING METHOD HSA				
DRILLER NICK LOG BY VF		В	DATE DRILLED 3-13-98	NOTES		

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
1						0 - 12.0 ' GREY AND BROWN CLAY
2						LITTLE TO TRACE SILT, TRACE
3					10	FINE TO COARSE SAND, WET,
4						DISTURBED, SLIGHT ODOR,
5						PLANT DEBRIS, (WOODY)
6						
7			SS-26	3-3	ND	
8				3-4		
9			SS-27	3-3	ND	
10				3-4		
11			SS-28	6-7	ND	
12				9-11		12.0 - 19.8 GREY CLAY, SOME SILT.
13]		SS-29_	5-9	ND	TRACE FINE SAND, TRACE FINE
14				13-15		GRAVEL, DAMP, NO ODOR
15			SS-30	5-6	ND	
16]			8-11	<u> </u>	19.8 20.5 BROWN MEDIUM TO COARSE
17	<u> </u>		SS-31	7-10	ND	SAND, SATURATED, NO ODOR
18				10-11		
19			SS-32	4-6	ND	
20				6-11		
21						
22						
23						

PROJECT ENVIRO-CHEM		OWNER		SKETCH MAP
LOCATION ZIONSVILLE, IN W.C		W.O. NUMBER 2495-1010		ND - NOT DETECTED
BORING NUMBER IW-3	TOTAL DEPTH 26.0"		DIAMETER 8"	VPPM - VAPOR PARTS PER MILLION
SURFACE ELEV	WAT LEV: INIT		24-HRS	SS - SPLIT SPOON
SCREEN: DIA	LENGTH		SLOT SIZE	F - FINE M - MEDIUM
CASING: DIA	LENGTH		TYPE	C · COARSE
DRILLING COMPANY TOP FLIGHT		DRITILLING METHOD HSA		
DRILLER NICK	LOG BY VFB		DATE DRILLED 3/16/98	NOTES

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
1						0 - 6.0 GREY AND BROWN CLAY,
2						LITTLE TO TRACE SILT, TRACE
3					50	FINE TO COARSE SAND, WET,
4						DISTURBED, SLIGHT ODOR
5 6						6.0 - 10.0 BROWN SILT, TRACE F-M
7			SS-33	9-10	18.4	SAND, TRACE FINE GRAVEL,
8]			16-19		MOTTLED, DAMP, SLIGHT ODOR
9			SS-34	7-10	0.8	GRADATION INTO GREY CLAY
10				10-12	9.0	AND FINE SAND, MOIST
11]		SS-35	6-7	0.8	10.0 - 10.2 BROWN M-C SAND, SATURATED,
12				11-12		NO ODOR
13			SS-36	7-9		10.2 - 21.0 GREY CLAY AND SILT,
14	_			10-13		TRACE F-M SAND, TRACE
15			SS-37	6-7	1.7	FINE GRAVEL, (WELL ROUNDED TO
16				9-10		ANGULAR), DAMP, NO ODOR
17			SS-38	4-4	0.8	
18				6-8	<u> </u>	21.0 - 26.0 BROWN F-C POORLY
19			SS-39	4-5	0.8	SORTED, WELL ROUNDED TO
20				7-8		ANGULAR GRAVEL, SATURATED
21	_		SS-40	4-4	0.8	NO ODOR.
22	_			9-13		
23			SS-41	4-6	1.7	

DRILL LOG - IW 3 (continued)

PROJECT ENVIRO-CHEM		OWNER		ND - NOT DETECTED
LOCATION ZIONSVILLE, IN		W.O. NUMBER 2495-1010		VPPM - VAPOR PARTS PER MILLION
BORING NUMBER IW-3	TOTAL DEP	TH 26.0" DIAMETER 8"		SS - SPLIT SPOON
SURFACE ELEV WAT LEV: IF		NIT 24-HRS		F - FINE M - MEDIUM
SCREEN: DIA LENGTH		SLOT SIZE		C - COARSE
CASING: DIA LENGTH		TYPE		
DRILLING COMPANY TOP FLIGHT		DRITILLING METHOD HSA		
DRILLER NICK LOG BY VF		- B	DATE DRILLED 3/16/98	NOTES

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
24				6-7		
25			SS-42	5-7	1.7	
26				8-8		
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PROJECT ENVIRO-CHEM	OWNER	***********	SKETCH MAP
LOCATION ZIONSVILLE, IN	W.O. NUMBE	R 2495-1010	ND - NOT DETECTED
BORING NUMBER IW -4	TOTAL DEPTH 28.00"	DIAMETER 8"	VPPM - VAPOR PARTS PER MILLION
SURFACE ELEV	WAT LEV: INIT	24-HRS	SS - SPLIT SPOON
SCREEN: DIA 4"	LENGTH 10'	SLOT SIZE .020	F - FINE M - MEDIUM
CASING: DIA 4"	LENGTH 17'	TYPE PVC	C - COARSE
DRILLING COMPANY TOP FLIGHT DRITILLING		METHOD HSA	C-COARSE
DRILLER NICK	LOG BY VFB	DATE DRILLED 3/16/98	NOTES

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
1						0 - 7.0 GREY BROWN CLAY, LITTLE
2						TO TRACE SILT, TRACE FINE
3					110	TO COARSE SAND. WET,
4						DISTURBED, ODOR PRESENT
5 6			SS-43	8-11	6	7.0 - 10.0 GREY CLAY, SOME SILT,
7				12-12		TRACE FINE SAND, TRACE
8]		SS-44	10-11		M-C GRAVEL, DAMP, NO ODOR
9				14-16		
10			SS-45	6-7	41	10.0 - 10.2 BROWN M-C SAND, SATURATED.,
11				8-14		NO ODOR
12			SS-46	11-12	11	10.2 - 11.8 GREY CLAY, SCME SILT,
13				12-15		TRACE F-C SAND, DAMP, NO ODOR
14			SS-47	6-8	34	11.8 - 12.4 BROWN MEDIUM SAND, SATURATED,
15				12-14		NO ODOR
16			SS-48	5-4	15	12.4 - 13.8 GREY CLAY, SOME SILT, TRACE FINE
17				12-12		SAND, DAMP, NO ODOR
18			SS-49_	10-11	15.7	13.8-14.4 BROWN MEDIUM SAND, SATURATED,
19				12-18		SLIGHT ODOR
20			SS-50	9-10	3.5	14.4 - 15.2 GREY AND BROWN CLAY AND
21				10-11		SILT, TRACE F-C SAND/GRAVEL, DAMP
22			SS-51	3-4	13	15.2-15.6 BROWN MEDIUM SAND, SATURATED.
23				7-12		NO ODOR

DRILL LOG - IW 4 (continued)

PROJECT ENVIRO-CHEM	OWNER		SKETCH MAP
LOCATION ZIONSVILLE, IN	W.O. NUMB	ER 2495-1010	ND - NOT DETECTED
BORING NUMBER IW -4	TOTAL DEPTH 28.00"	DIAMETER 8"	VPPM - VAPOR PARTS PER MILLION
SURFACE ELEV	WAT LEV: INIT	24-HRS	SS - SPLIT SPOON
SCREEN: DIA 4"	LENGTH 10'	SLOT SIZE .020	F - FINE M - MEDIUM
CASING: DIA 4"	LENGTH 17'	TYPE PVC	
DRILLING COMPANY TOP F	LIGHT DRITILLING	METHOD HSA	C - COARSE
DRILLER NICK	ILLER NICK LOG BY VFB		NOTES

Depth (feet)	Graphic Log	Well Construction	Sample Number	Blow Count/ RQD/ % REC.	PID READINGS (VPPM)	DESCRIPTION / SOIL CLASSIFICATION((COLOR, TEXTURE, STRUCTURES, MOISTURE, OVA READINGS)
24			SS-52	3-6	3	15.6 - 17.8 GREY CLAY AND SILT,
25				10-10		TRACE F-C SAND/GRAVEL, DAMP,
26			SS-53	6-13	1	NO ODOR
27				15-21		17.8 - 21.0 BROWN POORLY SORTED
28						SAND, SATURATED, ODOR
						PRESENT
	ļ					21.0 - 25.0 GREY CLAY, LITTLE SILT,
						DAMP. SLIGHT ODOR
						25.0 - 25.3 BROWN SAND, SATURATED.
]					NO ODOR
						25.3 - 27.0 GREY CLAY, LITTLE SILT,
]					NO ODOR, DAMP
						27.0 - 27.3 BROWN SAND, SATURATED,
						NO ODOR
						27.3 - 28.0 GREY CLAY, LITTLE SILT,
			_			DAMP, NO ODOR
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